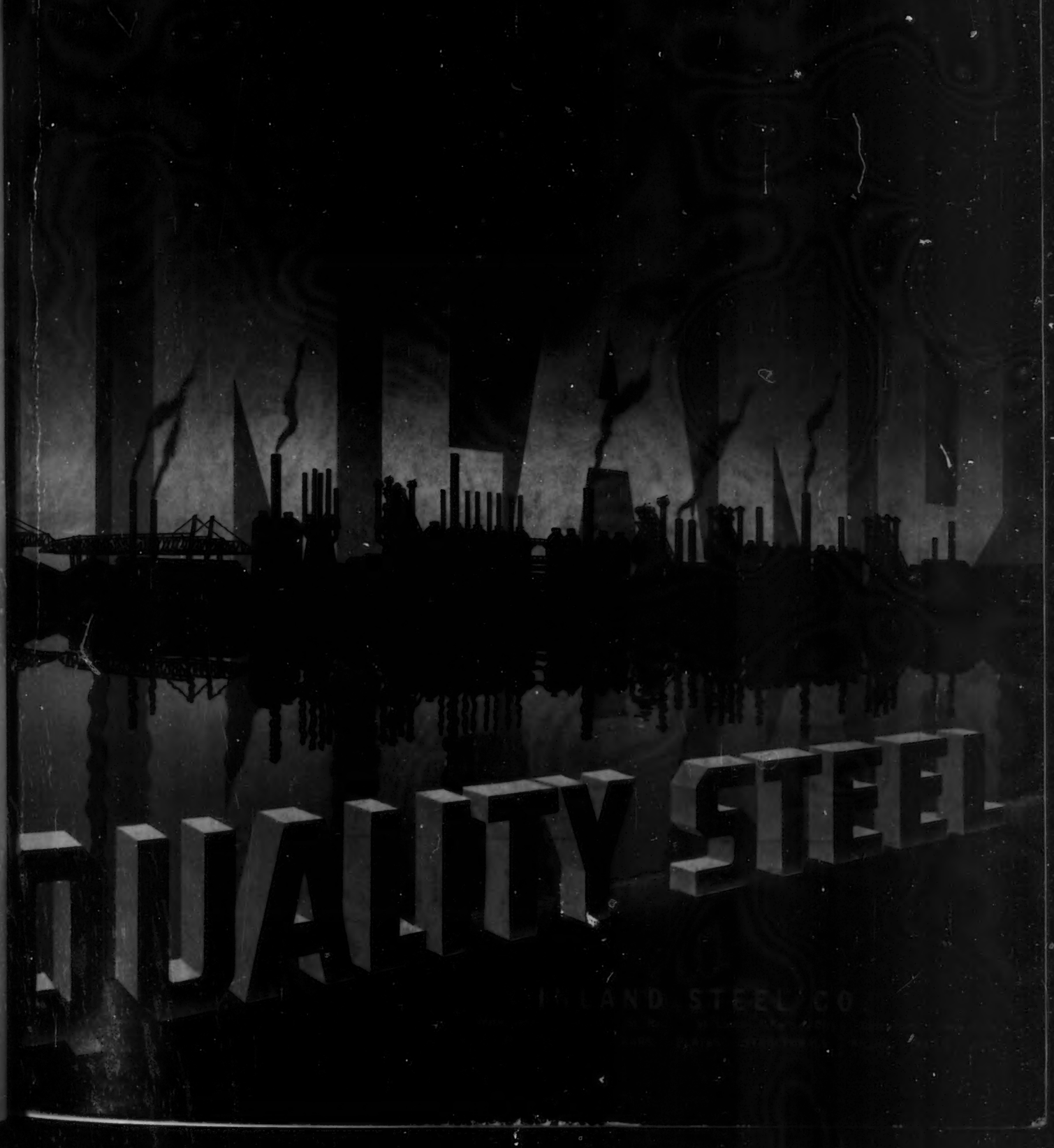
JANUARY 1, 1942

The IRON AGE



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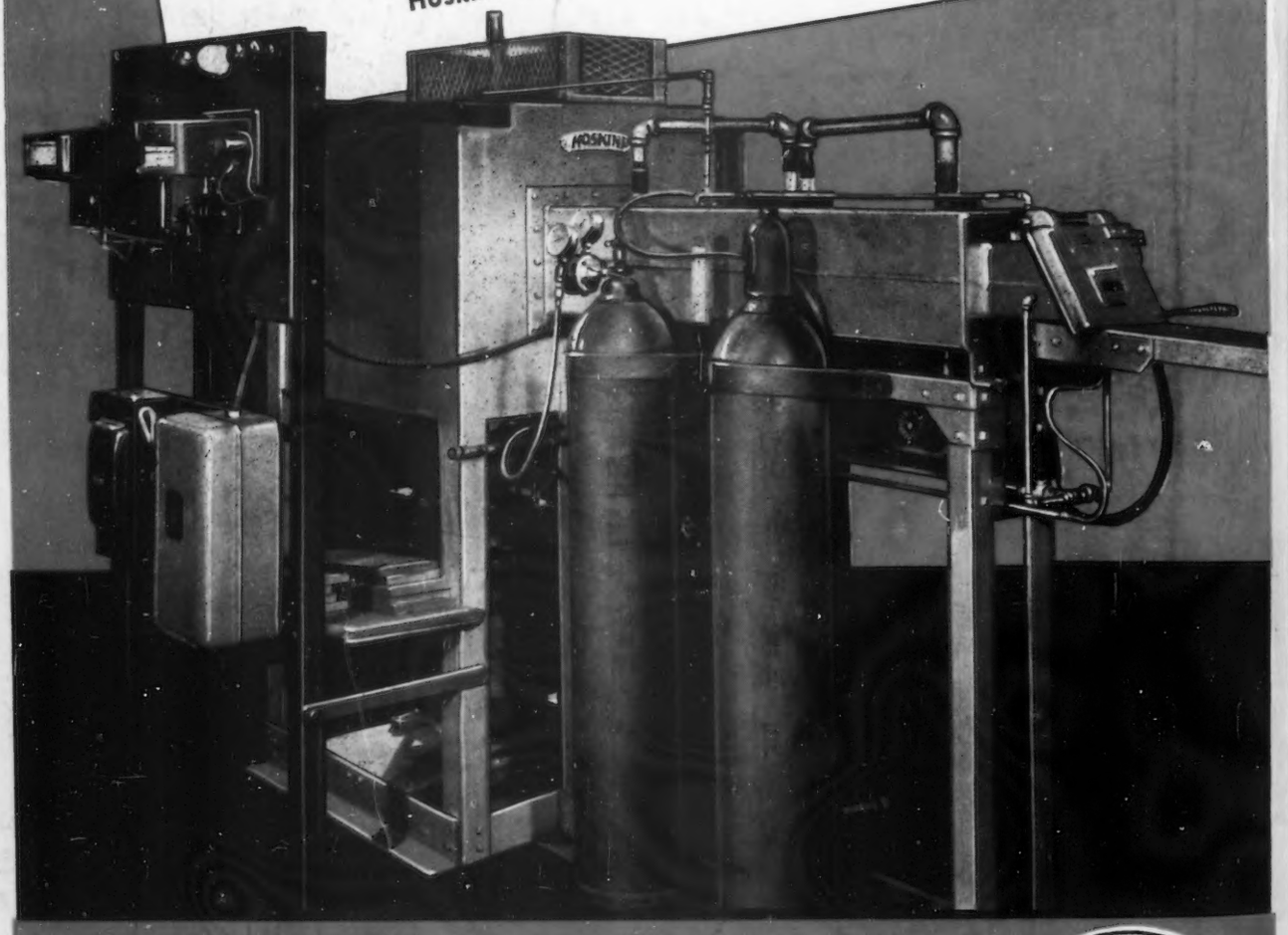

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Large and complete stocks, steel of known quality, prompt and dependable service . . . . these are the rugged cornerstones on which the Ryerson business has been built. 100 years of experience is at the disposal of Ryerson customers to help them meet every steel problem. Today, our stock in many lines is depleted and war needs have the right of way. However, we continue to serve every customer to the best of our ability in accordance with the Government Program. Joseph T. Ryerson & Son, Inc., Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City.

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THE IRON AGE

JANUARY 1, 1942

ESTABLISHED 1855

Let Us Resolve—

THEY said that America had become decadent and soft. They said that we loved comfort more than principle; that we lacked the guts of our grandfathers.

They said that our manufacturers put profits above patriotism; that our workers lacked a sense of civic responsibility and were interested solely in exacting the last farthing.

They said that our Democratic way of life was done; that our legislators had become opportunists and practitioners of expediency; that we were being ruled and ruined by gangsters and racketeers. They said that America couldn't fight.

And then came Colin P. Kelly, Jr. And those miasmic mists of doubt in one another vanished in the bright sunlight of heroism.

Captain Kelly had much to live for. A beautiful wife and a year-old son meant as much to the future of this 26-year-old father as any man's future means to him. Life is sweet, at 26, when you have these to come home to.

But Captain Kelly did not come home. He gave all that he had to his country.

Captain Kelly sank, singlehanded, an enemy battleship. He died in line of duty to his country.

But sinking that battleship was not the greatest thing that Captain Kelly did for his fellow Americans. Beyond and above that was the fire that he kindled in the souls of his countrymen. He taught us, as others like him are continuing to teach us, that the red blood of heroism still courses through American veins. That we are not a soft and decadent people but that we, like him, can if we will—and we will—subjugate all self interest to the service of our country.

So I say to you, whatever your position in life or your occupation, remember Captain Kelly. And resolve to emulate his fine devotion to his country.

Perhaps you will not, like him, have the honor of dying for it. But you can live for it in similar heroic fashion.

If you are an employer, think of Captain Kelly when self interest is in conflict with service to your country and our common cause. And resolve to act as you know he would have, were he the one to make the decision.

If you are a worker, think of Captain Kelly as you run your machine or assemble your product and give all that is in you to the vital task of arming his comrades.

If you are a statesman, let the shadow of Captain Kelly fall upon your shoulder as you vote upon legislation, and you will fearlessly legislate for all America just as he died for every American.

I know no better New Year's resolution.

J. H. Van Deventer

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INLAND STEEL CO.

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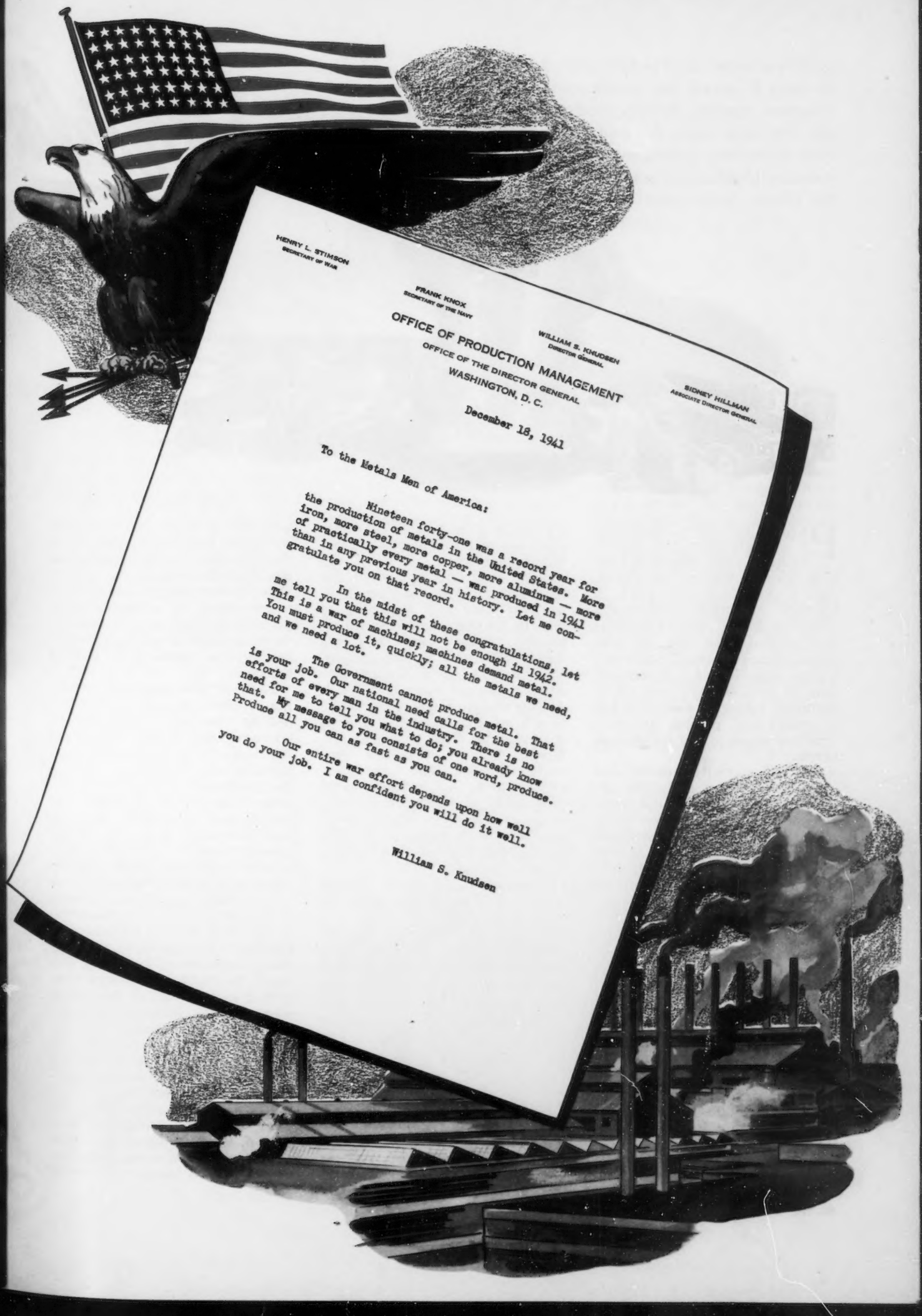

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OFFICE OF THE DIRECTOR GENERAL
WASHINGTON, D. C.

December 18, 1941

To the Metals Men of America:

Nineteen forty-one was a record year for the production of metals in the United States. More iron, more steel, more copper, more aluminum — more of practically every metal — was produced in 1941 than in any previous year in history. Let me congratulate you on that record.

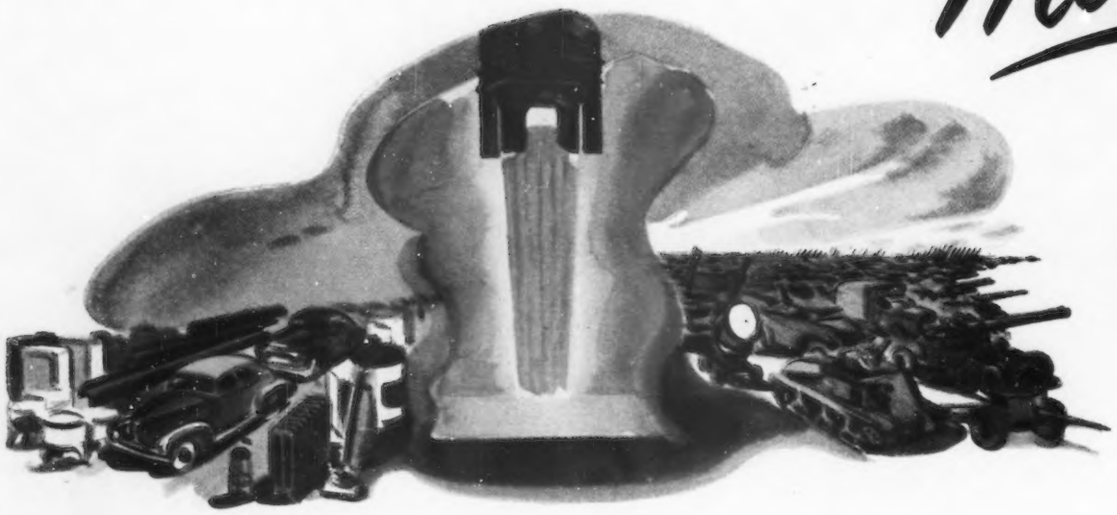
In the midst of these congratulations, let me tell you that this will not be enough in 1942. This is a war of machines; machines demand metal. You must produce it, quickly; all the metals we need, and we need a lot.

The Government cannot produce metal. That is your job. Our national need calls for the best efforts of every man in the industry. There is no need for me to tell you what to do; you already know that. My message to you consists of one word, produce. Produce all you can as fast as you can.

Our entire war effort depends upon how well you do your job. I am confident you will do it well.

William S. Knudsen

Metals



PERHAPS to some future Gibbon, registering the crimes, follies and misfortunes of mankind, the year 1941 will be nothing more than a sharp little jiggle in the curve charting the queer course of human destiny. But to the little man of that year—the guy who works, votes, occasionally prays and always pays—it was a momentous year of great activity and bitter confusion, taking an exorbitant toll of energy and probing his most sensitive economic and sociological nerves.

Why this activity, tension and confusion? Hitler a decade ago said that they would be the symptoms of "the last disgusting death rattle of a corrupt and outworn (democratic) system." But it is to be hoped that history will show them as rather disconcerting birth pangs initiating a tremendous industrial effort of a somewhat effete democracy none too confident of its "rendezvous with destiny." Quite obviously the core of this industrial effort has been the metals industry, and it has reeled all year under the impact of a goodly portion of the activity, tension and confusion. Every decision, mistake and triumph has been the subject of close scrutiny and comment by a bevy of opinionists, analysts and impressionists—all quite understandable in view of the quite obvious fact that this second world war is a conflict of metals and metallurgy, whereas the first world war could perhaps be called a conflict of chemistry, and all previous wars a clashing of manpower.

Very early in 1941, when the fingers of the somber shadow of all-out war were only beginning to close in, the ever-smoldering schizophrenia of the American people flamed with startling abruptness. The nation's youth flooded into Army camps and matrons on Fifth Avenue slugged their way savagely to silk stocking counters. And on the industrial front it was no different. Billions of dollars were hastily dumped into war enterprises, while innumerable metal consuming plants worked extra shifts at a hitherto unprecedented pace—not on implements of war, but on conventional consumer goods; consumer goods to meet a spectacular nation-wide buying spree and to amass impressive futures on warehouse shelves.

The impact of all this was too concentrated, even for the much-vaunted American industrial system that flag wavers are so prone to flaunt smugly before the world. Something had to crack. Something did crack. At first, crescendo, then by mid-year fortissimo, were the cries of makers of civilian goods, as metal shortages developed. By April came a pinch in aluminum, magnesium, copper, nickel and other non-ferrous metals, then steel shortages by September. Just as might be expected, the most pitiful laments frequently came from those companies least hurt. And, while the cruel farce of sub-contracting was cynically played on a well lit stage, in the wings many a small manufacturer of consumer goods patiently sickened or died with the fortitude and lack of display which is always so typical of the poor or the small.

Beset by mounting manufacturing problems, distrustful and baffled by Washington, bedeviled by labor disputes, rushed along on a full flood of events leading into unfamiliar and distressing political and sociological territory, the metals industry during the year dug in and, in general, did a remarkable job of production. It also cursed Roosevelt, went after each others' customers with renewed vigor, kept a fairly sharp eye on selfish interests and, on occasion in torment, lashed viciously at minutiae. With little or no investigation and even less understanding, bitter barbs were leveled at England for "selling lease-lend steel in South America," or for selling comparatively infinitesimal quantities of metal products in this country, or against Canada for selling die castings in the Detroit area, etc., etc. Only serious industrial repression and abject crawling, particularly on the part of England, served to appease the blind wraths. And in England, while there is thankfulness for American aid, there is a certain amount of

IN 1941 . . .

One full year of mournful errors, mean politics, humble cares, fears, fleers and jeers. A year of hard work, of flim-flam stories, phrase mongering, and futile speeches. A year wherein the world's greatest metal-working potential nervously started to work up a formidable momentum that may yet lift a tormented world off its hinges.

o o o

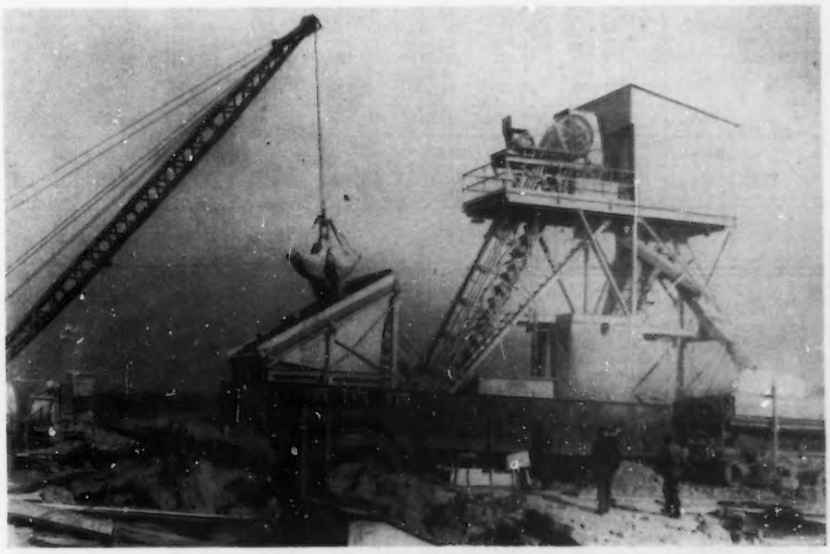
By T. W. LIPPERT
Managing Editor, The Iron Age

o o o

acrimonious talk of the sinister designs of American producers on British export markets, and a certain amount of wonder as to how they will live after the war is over. But for ignorance and infantilism, manifest in its most vicious form, probably nothing will ever quite approach Senator Nye enthralling a wildly cheering audience with bitter condemnation of the government for permitting a Navy Yard to sell a monthly scrap list of aluminum while the house-to-house aluminum begging campaign was in progress; or Senator Wheeler waving a fistful of toy lead soldiers in the U. S. Senate during one of the most critical periods in the Nation's history, crying meanwhile, "here are British Redcoats made of lead sent over here when we in the United States are told that use of lead must be curtailed because of defense. Why are these little toy soldiers here?"

The aberrations of Senators Nye and Wheeler are, of course, only several of many examples of the ridiculous in conception of the problems of metals in 1941. But, just one step above the ridiculous is the sublime, and sublime ineptitude is about the kindest way certain activities of OPM in 1941 can be described. Granted, of course, that OPM is staffed with many sincere men, in some instances with brilliant men, and also granted that the metals industry in 1941 was involved in such a train of unforeseen and unsupposed circumstances that no human wisdom could accurately calculate the end. Nonetheless, the basic policy has been to insist on square pegs in round holes; of having a man who knows nothing about a particular metal rule that metal; of sending a plumber to fix a watch. This policy apparently stems right back to President Roosevelt. The result of all this has been primarily one of jackassing in more capacity —of substituting capacity for experience in an industry—of solving the day-to-day problems of a particular metal by half measures or letting them degenerate in chaos. Even today, with the country at war, there has been little or no elevation of men with knowledge of a particular metal to a position of authority in that metal, the result being that certain industrial excesses and selfish practices continue, certain half measures falter along, and large quantities of metal lie idle while machines af war wait. This all translates in the possibility that on some future battlefield American soldiers may wait in vain for 100 more airplanes or 1000 more rounds of ammunition—airplanes and ammunition that could have been there, if!

Take, for instance, copper and zinc, two metals which very early went under full priority control. First, fearing a shortage of zinc, industry was urged to switch from brasses to bronzes and silicon bronzes, then in six months there has been a complete reversal, and the urge is now to switch back to brasses to save copper. With no centralized control of zinc consumption, one agency of the government would demand that galvanizers reduce consumption, or that steel be painted rather than galvanized. At the same time another agency would be recklessly ordering prime galvanized sheets for grain bins, roofing or a multitude of other uses where either wood or uncoated steel would have been satisfactory. Table IV shows that plenty of the galvanized steel output in 1941 went into usual consumption channels having no connection with the war effort. At present it is believed there will be enough zinc for essential needs. Now the government fears a copper



One generation's waste is another generation's gain. This separating unit at South Chicago is working an old slag dump to recover upwards of 95 per cent of the metallics contained therein.

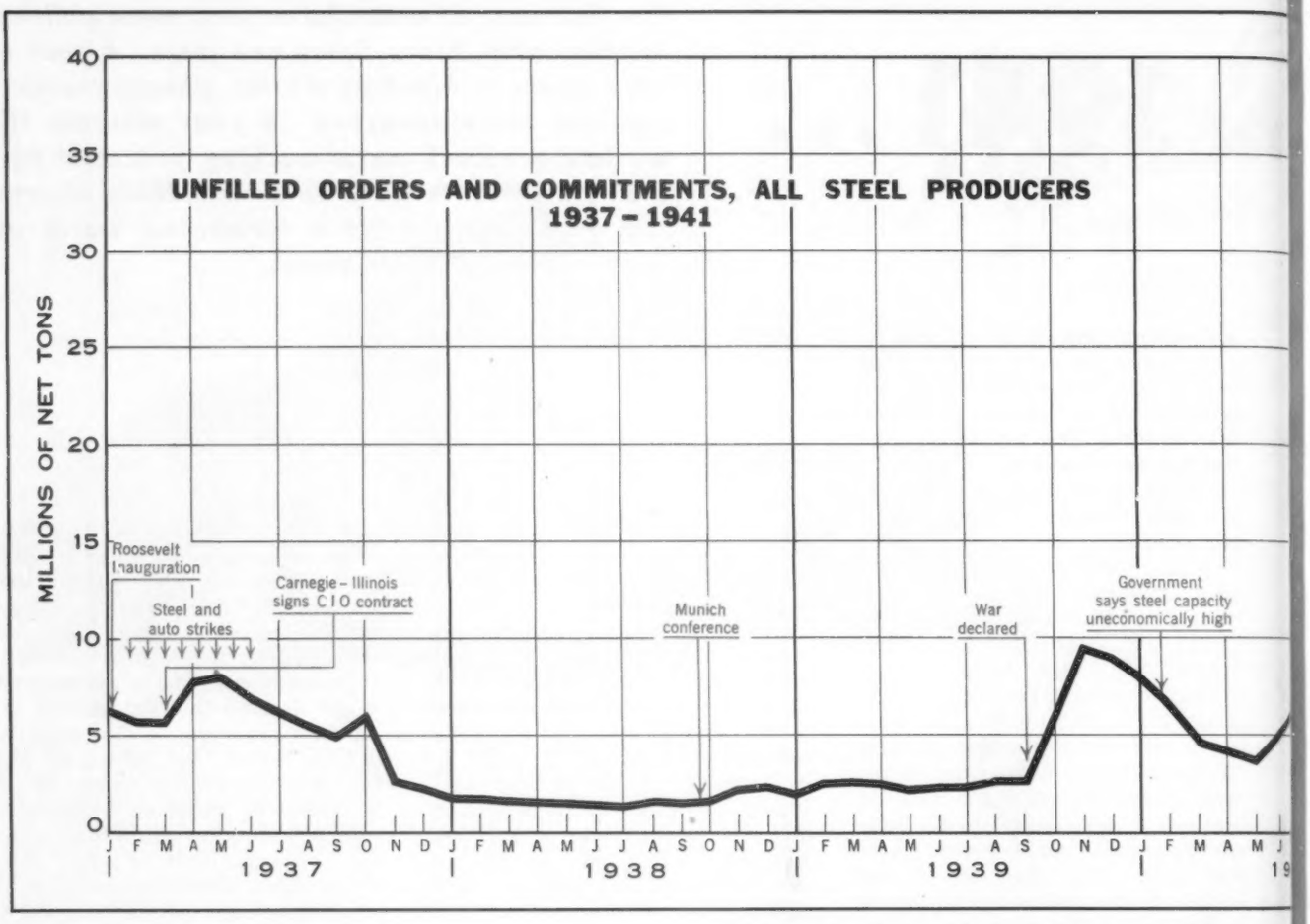

UNFILLED ORDERS AND COMMITMENTS, ALL STEEL PRODUCERS
1937 – 1941
MILLIONS OF NET TONS
40
35
30
25
20
15
10
5
0
Roosevelt Inauguration
Steel and auto strikes
Carnegie – Illinois signs C I O contract
Munich conference
War declared
Government says steel capacity uneconomically high
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J
1937
1938
1939

TABLE I Distribution of Steel Shipments, All Steel

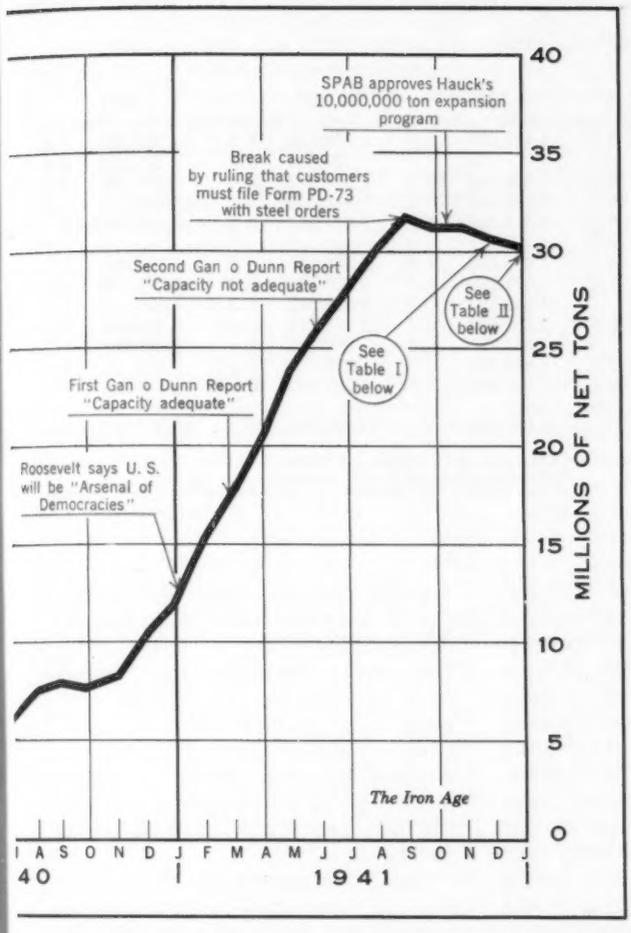
Classification	Ingots, Blooms, Billets, Slabs, Tube Rounds, Sheet and Tin Bars	Structural Shapes and Piling	Plates (Universal and Sheared)	RAILS		Tie Plates and Track Accessories including Track Spikes	HOT ROLLED BARS			Cold Finished Bars (Carbon and Alloy)	Pipe and Tubes	Wire Rods	Wire and Wire Products including Fence Posts	Black Plate
				Over 60 lb.	All Other		Carbon including Hoops and Bands	Concrete Reinforcing	Alloy					
Army-Navy	72,290	105,493	142,500	3,532	71	2,320	76,236	75,397	36,348	27,588	23,700	6,485	18,920	183
Other U. S.	4,449	72,165	125,022	16	22	5	9,482	2,530	1,375	295	10,771	366	1,962	581
Lend-Lease	279,637	3,138	10,320	18,258	180	1,622	9,600	2,424	14,194	4,342	6,905	11,524	3,424	116
Division of Priorities	89,176	147,723	190,180	108,730	4,780	69,995	163,292	49,798	40,415	24,344	54,300	24,430	31,540	2,767
Other Export	2,290	11,970	12,925	190	544	1,466	78,146	4,591	4,023	2,683	19,106	5,141	18,190	9,262
Warehouses	2,414	40,591	13,725	190	1,050	1,291	60,770	11,420	9,460	20,067	79,286	3,564	104,140	2,888
OPA	7,846	1,930	1,970	.....	.....	.....	13,851	330	2,791	3,552	2,381	660	3,702	1,195
All Other	57,695	28,106	14,540	9,624	641	2,222	98,035	6,818	26,016	22,974	126,345	39,891	93,805	31,554
Sub-Total Carbon	445,530	411,116	489,941	140,540	7,288	78,921	509,412	153,308	.....	69,375	308,520	91,137	271,942	48,546
Sub-Total Alloy†	70,267	.....	21,241	.....	.....	.....	.....	.....	134,612	36,470	14,274	924	3,741	.....
Total	515,797	411,116	511,182	140,540	7,288	78,921	509,412	153,308	134,612	105,845	322,794	92,061	275,683	48,546

TABLE II Distribution of Total Unfilled Orders and Commitments

Classification	Ingots, Blooms, Billets, Slabs, Tube Rounds, Sheet and Tin Bars	Structural Shapes and Piling	Plates (Universal and Sheared)	RAILS		Tie Plates and Trade Accessories including Track Spikes	HOT ROLLED BARS			Cold Finished Bars (Carbon and Alloy)	Pipe and Tubes	Wire Rods	Wire and Wire Products including Fence Posts	Black Plate
				Over 60 lb.	All Other		Carbon including Hoops and Bands	Concrete Reinforcing	Alloy					
Army-Navy	449,611	454,727	895,856	33,847	298	9,820	459,541	316,203	209,166	245,100	89,071	24,208	65,117	958
Other U. S.	46,237	273,660	1,381,793	560	45	241	50,839	11,013	9,299	1,131	56,306	1,229	10,392	1,189
Lend-Lease	1,314,754	17,545	99,145	79,176	341	4,512	38,633	14,610	82,290	21,406	33,308	26,874	21,873	687
Division of Priorities	445,810	689,609	1,460,484	1,668,976	38,555	666,551	1,403,200	305,300	158,800	102,901	184,279	135,643	107,347	5,378
Other Export	7,430	95,636	123,570	204,906	13,641	45,340	210,232	65,600	14,630	14,406	114,081	34,796	99,977	20,778
Warehouses	8,541	287,920	266,150	11,576	9,676	4,636	515,103	71,295	57,855	160,401	314,898	10,864	357,415	5,480
OPA	47,130	19,880	22,950	2,246	.....	220	180,460	3,699	12,638	22,500	12,797	5,304	12,451	2,527
All Other	393,590	259,122	336,471	80,725	3,949	68,700	780,751	66,732	148,103	160,303	634,977	270,600	432,674	122,097
Sub-Total Carbon	2,404,277	2,098,099	4,460,079	2,082,012	66,505	800,020	3,638,759	854,452	.....	506,851	1,321,511	506,118	1,085,381	159,094
Sub-Total Alloy†	308,826	.....	126,340	.....	.....	.....	.....	.....	692,781	221,300	118,206	3,400	21,865	.....
Total	2,713,103	2,098,099	4,586,419	2,082,012	66,505	800,020	3,638,759	854,452	692,781	728,151	1,439,717	509,518	1,107,246	159,094

*Based on figures released by AIS, Department of Commerce figures, individual reports, and estimates by the author.

†Stainless steel, and electric furnace and open hearth alloy steel.


SPAB approves Hauck's 10,000,000 ton expansion program
Break caused by ruling that customers must file Form PD-73 with steel orders
Second Gan o Dunn Report "Capacity not adequate"
See Table II below
See Table I below
First Gan o Dunn Report "Capacity adequate"
Roosevelt says U. S. will be "Arsenal of Democracies"
The Iron Age
MILLIONS OF NET TONS
40
35
30
25
20
15
10
5
0
I A S O N D J F M A M J J A S O N D J
40
1941

1941 Tried the Steel Maker's Soul

● And here is why! Total finished steel backlog for the entire industry meanders along through the relative prosperity of 1937 and the doldrums of '38, '39 and '40, only to spurt at a dizzy pace in 1941. Late in 1941 the crush of orders had the industry pretty well rocked back on its heels, and only the wiping out of duplicate orders and overbuying by means of form PD-73 served to stabilize promise sheets. The capable way the industry performed in December is shown in Table I below, and total commitments already listed on makers' books for 1942 are shown below in Table II.

Data for the backlog graph were secured from steel makers having 68 per cent of the country's capacity, converted to 100 per cent with proper consideration of carbon and alloy balance. Data in Tables I and II came from early AIS estimates, Department of Commerce, various private reports, and estimates of author from information supplied by several major producers. Some minor errors are probably due to diversity of information sources.

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Producers, for Month of December,* 1941 (In Net Tons)

Tin and Terne Plate (Hot Rolled and Cold Reduced)	SHEETS AND STRIP: Hot Rolled	Cold Rolled	Galvanized	All Other	Tool Steel Bars	Wheels and Axles	FORGINGS: Armor Plate and Ordnance	All Other	Steel Castings	Skelp	All Other	TOTAL: Carbon	Alloy†	Classification
4,959	72,208	20,631	10,508	3,221	2,380	276	39,273	4,818	794	1,369	8,866	636,130	124,236	Army-Navy
111	4,270	474	1,603	50	70	44		1,324	884	74	381	235,655	2,671	Other U. S.
37,523	8,214	3,703	1,020	819	389	46	78	429			310	392,459	25,756	Lend-Lease
7,564	175,410	39,049	14,763	6,320	6,445	34,270		3,600	3,820	16,169	6,078	1,200,708	114,250	Division of Priorities
67,013	18,315	11,341	6,900	1,029	610	1,535	252	106	22	11,200	1,487	283,233	7,104	Other Export
2,843	25,395	14,523	30,064	956	2,858			273	4		3,565	410,259	21,068	Warehouses
22,162	23,270	12,422	3,790	1,083	73	11		79	9		705	92,189	11,623	OPA
266,547	271,063	157,571	15,910	13,523	709	764		859	277	29,666	3,318	1,280,340	58,133	All Other
428,722	598,145	218,727	84,558	27,001	2,654	36,850	18,467	11,488	5,222	58,478	15,085	4,530,973		Carbon — Sub-Total
		40,987			10,880	96	21,136		588		9,625		364,841	Alloy† — Sub-Total
428,722	598,145	259,714	84,558	27,001	13,534	36,946	39,603	11,488	5,810	58,478	24,710	4,895,814		Total

All Steel Producers,* as of Jan. 1, 1942 (In Net Tons)

Tin and Terne Plate (Hot Rolled and Cold Reduced)	SHEETS AND STRIP: Hot Rolled	Cold Rolled	Galvanized	All Other	Tool Steel Bars	Wheels and Axles	FORGINGS: Armor Plate and Ordnance	All Other	Steel Casting	Skelp	All Other	TOTAL: Carbon	Alloy†	Classification
16,366	343,507	151,130	42,999	16,258	10,204	2,060	666,817	35,474	8,725	4,673	70,412	3,811,882	810,266	Army-Navy
400	21,423	2,238	7,681	205	249	169	361	25,087	7,075	594	1,481	1,868,897	42,000	Other U. S.
84,947	42,662	12,216	4,299	4,180	1,823	6,442	1,839	4,135	572	645	2,986	1,749,135	172,765	Lend-Lease
23,332	831,936	175,606	78,267	28,243	23,965	249,623	200	24,934	22,028	57,179	34,850	8,452,600	470,398	Division of Priorities
285,540	188,280	75,317	33,591	4,776	1,894	12,206	9,343	681	322	63,281	12,641	1,711,590	41,305	Other Export
11,983	227,504	118,710	183,769	4,985	12,002			1,172	82	764	13,020	2,544,783	111,018	Warehouses
31,826	177,161	66,201	21,215	6,779	223	43		468	79	59	4,568	579,978	73,446	OPA
1,010,339	1,896,439	1,183,412	181,977	88,592	4,081	4,743		7,559	2,221	146,471	27,360	7,943,189	368,802	All Other
1,464,733	3,728,912	1,580,405	553,798	154,018	7,040	274,794	452,131	99,510	38,429	273,666	51,460	28,662,054		Carbon — Sub-Total
		204,425			47,401	492	226,429		2,675		115,858		2,089,998	Alloy† — Sub-Total
1,464,733	3,728,912	1,784,830	553,798	154,018	54,441	275,286	678,560	99,510	41,104	273,666	167,318	30,752,052		Total

TABLE III—Steel Distribution by Consuming Industries (1929, 1937 to 1941)

(In Net Tons and Per Cent of Total)

	1929		1937		1938		1939		1940		1941	
	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent
Agriculture	3,060,960	6.7	2,335,200	5.7	1,109,920	4.7	1,420,697	3.6	1,629,849	3.3	1,722,302	2.4
Aircraft	(a)		(a)		(a)		(a)		51,400	0.2	531,528	0.9
Automotive	7,352,800	16.0	7,814,240	18.9	4,053,280	17.2	5,906,358	15.1	7,964,923	16.4	9,501,300	15.9
Construction	8,643,040	18.8	6,037,920	14.7	4,398,240	18.7	6,100,386	15.6	6,935,889	14.3	9,870,258	16.4
Containers	1,911,840	4.2	3,218,880	7.8	2,136,960	9.1	2,978,463	7.6	3,067,517	6.3	4,429,518	7.4
Furniture, furnishings	700,000	1.5	1,494,080	3.6	868,000	3.7	1,182,235	3.0	(b)		(b)	
Machinery, tools	2,028,320	4.4	1,804,320	4.4	831,040	3.5	1,460,000	3.7	2,330,365	4.8	3,264,898	5.4
Oil, gas, water, mining	4,117,120	8.9	3,034,080	7.4	1,820,000	7.7	1,841,599	4.7	1,900,286	3.9	2,814,454	4.7
Pressing, form., stamp.	(c)		(c)		(c)		659,864	1.7	2,296,355	4.7	3,572,534	5.9
Railroads	8,162,560	17.7	4,686,080	11.4	1,443,680	6.1	3,250,022	8.3	4,019,219	8.3	5,813,518	9.7
Shipbuilding	346,080	0.8	390,880	0.9	389,760	1.7	517,771	1.3	999,858	2.1	2,809,238	4.7
Exports	2,495,360	5.4	3,032,960	7.4	1,752,800	7.4	2,594,700	6.7	8,098,874	16.6	5,863,838	9.8
All other	7,179,666	15.6	7,329,716	17.8	4,765,271	20.2	11,155,458	28.7	9,365,834	19.1	10,119,324	16.8
TOTAL	45,997,746	100%	41,178,356	100%	23,568,951	100%	39,067,553	100%	48,660,369	100%	60,000,000	100%

NOTE: Distribution 1929 to 1938 by M. W. Worthing, based on data from The Iron Age; 1939 to 1941 from The Iron Age, various Government reports, and early AIS 18 estimates, with jobber tonnage distributed and other alterations made according to the technique devised by M. W. Worthing.

(a) Negligible, or not available and included in All Other.
(b) Included in Pressing, Forming, Stamping.
(c) Included partly under Furniture and Furnishings and partly under All Other.

shortage sufficient to interfere with the 600,000 tons of cartridge brass planned for 1942. A stop-gap use of steel for cases has been laboriously devised by metallurgists to take up some of the slack, some 500,000 tons of copper per year is brought in from Chile—and, then, a few weeks ago, the country was flabbergasted by the news that domestic copper mines and refineries have been ambling along on a 40-hr. week. And no one seems to give much of a damn about the large volume of domestic marginal production available.

Also, copper and brass mills have usually found it satisfactory to cast billets for subsequent rolling. Now enormous extrusion presses (the government pays for them) are built and a-building to extrude billets for subsequent rolling. An early OPM order tied up all use of secondary copper while at the same time various war industries still insist on brasses and bronzes so low in lead that scrap copper must be involved in the rank waste of going back through the refinery. Secondary firms are today glutted with copper and can't sell it. Even just a little intelligent effort could force all of the secondary metal into certain applications that have been and are today absorbing large tonnages of virgin copper, thereby releasing the latter for war work that is currently marking time.

In aluminum, too, the government has been so engrossed in giving the industry a public hot-foot that the problem of secondary metal cries in vain for attention—a situation that is both tragic and baffling. Right today there is no one in authority in Washington who knows the intricacies of the aluminum industry. At the moment there is a peak stock of aircraft aluminum on hand, and perhaps this has lulled many into a false sense of security. But, by mid-1942 some large aircraft assembly units will be swinging into production, as for instance Ford's bomber plant, and the demands for aluminum will multiply overnight. Actually the country may witness the tragic sight of some assembly lines on the slow-down for want of aluminum—a situation that could probably have been avoided. And, what a difference 100 more planes may make at some future Singapore.

All year there has been no one to say nay to the insistence of the iron and steel industry for excessively pure aluminum for deoxidizing purposes—and what a large tonnage of high grade aluminum has disappeared in that direction! Nor has anyone critically examined or stopped the absorption of virgin metal for many aircraft parts and innumerable other armament uses in tanks and naval vessels, when secondary metal could have been successfully used. In the secondary field the government has created another of those quaint anomalies that has so many tragic overtones. Secondary melters can only sell their metal for armament uses, which on the whole, blindly refuse to use anything but virgin metal. Of course the result is that scrap aluminum is practically a drug on the market — secondary smelters can't stock any more. And at the same time the country is treated to a public collection campaign that brought in a conglomeration of material that in no way justified the segregation costs involved. What should long ago have been done—what should today be done—is to stop virgin aluminum from going into unnecessary outlets; to displace virgin aluminum with secondary metal in a great variety of applications, and build up large stocks of virgin metal to handle the very heavy new loads that are shortly inevitable.

The nickel position is fairly well in hand, even though some wholly unnecessary loads were thrown on that metal during the year. For instance, the insistence of many metal firms for heat treating and annealing furnaces using elaborate conveyors, walking beams, alloy hearths or innumerable other high-nickel castings, when car-bottom or rotary hearth furnaces would perform adequately during the emergency at far less initial cost. The imported metal, tin, so far in excellent shape, is in for plenty of trouble—Rising Sun trouble. Magnesium is undergoing a tremendous expansion, some of it quite curious in character and best not discussed here. And, despite the complete inadequacy of magnesium output to match armament needs, there is—or until quite recently was—an astonishingly large amount of orphan and high-iron magnesium kicking around in the market. Here again more could be done to prepare for the tremendous added load magnesium (and aluminum) is going to be subjected to early in 1942 as thermite bomb plants swing into full production.

The exploitation pattern in the major non-ferrous metals, however, fade into comparative insignificance when stacked up against the

long and continuing din of accusation, defense, confusion and debate raging around the steel industry. Steel is a metal of tremendous and diversified tonnage, of complex production and fabrication ramifications, and in general is a pretty tough nut to crack into neat pieces for analyzing. The elusiveness of basic data, the ever-expanding loads heaped onto the industry, the interplay of competitive relationships, the vagueness of consumption information, the overlapping of military and civilian uses, the impact of highly-placed political log rolling, the indefinite responsibilities and dreary confusions in OPM, all contributed to a general blurring of the outlines of what has and what may happen in the steel industry.

Those sections of the outline that can be brought into focus, however, pretty well sum up as follows:

(1) The bulk of steel in 1941 can be directly traceable into so-called civilian consumption. See Tables III and IV.

(2) Steel directly traceable to armament needs in 1941 was astonishingly small. Those tonnages not directly traceable are indefinite and probably never will be determined.

(3) When steel spokesmen say there is enough capacity, they are referring to enough for essential armament needs and a certain proportion of civilian needs. When government spokesmen say there isn't enough capacity, they are referring to essential armament needs and a certain proportion of civilian needs. Why the two never seem to agree can be attributed to indefiniteness of "a certain proportion of civilian needs," and a vagueness as to what constitutes "indirect defense."

(4) In 1941 practically no war production suffered for lack of steel. More railroad cars could have been built had plates been available. And in several instances shipyards were completed far ahead of schedule and had to wait on plates. On the other hand, certain shipyards used their priorities to build up excessive stocks. Specialized capacity, i. e., armor plate, heavy forgings, etc., was in general expanded apace with expanding demands.

(5) Early in 1941, everyone made the mistake of becoming too beguiled with ingot capacity as a figure, not fully appreciating the difficulties inherent in a distortion of the conventional product mix pattern. Hence, the difficulties resulting from the drastic shift from light to heavy steels in 1941. Steel for projected new capacity throws additional burdens on these heavy steels.

(6) Exports in 1941 fell considerably under first of the year estimates.

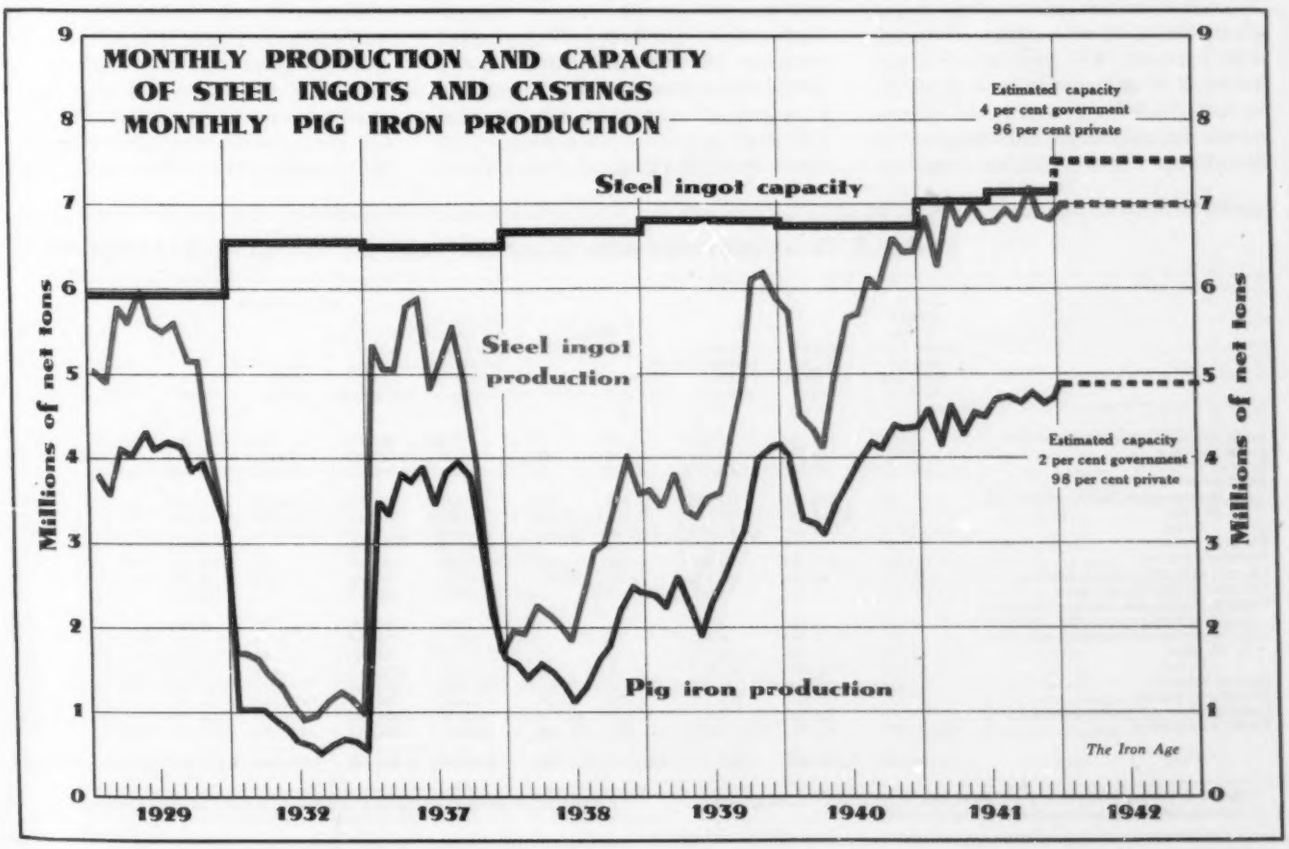
(7) Production in 1941 exceeded expectations: ingots — 82,800,000 tons, 24 per cent above the previous year's record output; finished steel—60,000,000 tons or more; pig iron—55,748,000 tons.

(8) Ingot capacity: Jan. 1, 1941 —84,152,000 tons; June 30, 1941—86,148,700 tons; Dec. 31, 1941—88,000,000 tons; all through increasing size of existing open hearths during rebuilds, and completion of new units privately financed.

(9) Pig iron capacity: Jan. 1, 1941—57,000,000 tons; June 30, 1941 — 57,937,000 tons; Dec. 31, 1941—59,437,000 tons. All through larger hearths during rebuild, rehabilitation of old units, private construction of new blast furnaces.

(10) Pig iron capacity at end of 1942 — 63,500,000 tons, quite likely; at end of 1943—67,000,000 tons, possibly. All increases government financed, much of it needed to protect planned ingot additions, and no provision as yet made for ore-carriers for 1943 additions.

(11) Ingot capacity at end of



1942—94,000,000 tons, maybe; at end of 1943—97,500,000 tons, unlikely. All the argument about advisability and feasibility of expansion centers in part of the 1942 planned expansion, and all the 1943 planned expansion. None the less, it is very likely that much of the 1942 expansion will reach completion, as it involves primarily alloy steel for aircraft, tanks and tools; ordinary steel for ships, freight cars and boilers; armor plate for tanks, ships, gun mounts, helmets and planes; bessemer steel to ease the pressure on scrap; and Provo expansion as a concession to strategic necessity.

(12) Steel makers have been and are in complete sympathy with increases of electric furnace capacity in 1941 of about 1,000,000 tons (up 40 per cent), and recognize necessity for further additions, as for instance, recently completed plans for new furnaces and finishing equipment for steel for aircraft tubing, which is imperative.

(13) For the most part, new capacity additions have been integrated into existing plants. This also is true of the West Coast expansion. Persistent political pressure was exerted to locate new capacity on the Coast, but operating economics finally dictated location at Provo.

(14) Probably many of the fears about the post-war effect of excessive capacity are somewhat exaggerated. Some of the new capacity is definitely temporary or uneconomic in character and doomed to die at war's end. And, anyhow, the general industrial health of the nation after the war will be so dominated by other factors, that the steel capacity situation will exert at best only a very small effect.

(15) The general assumption that scrap shortages will seriously curtail steel operation in 1942 is probably over-emphasized. Quite likely this situation need not become too serious. However, before the whole thing is over this country is going to be picked very clean of scrap, and incidental pots and pans, and the steel maker is going to turn out good steel with progressively poorer grades of material.

(16) The war program will eat so far into normal future scrap supplies that the bessemer converter will retain a far more prominent position after the war than it now occupies.

(17) The war is going to wipe out the whole current complex structure of highly diversified products and analyses. The greatly simplified system that is inevitable will extend into the post-war period with considerable benefit to both producer and consumer, and be probably accompanied by lower prices.

(18) Producers are going to learn how to make armament and other high grade steels without high alloy content. The present complex ternary and quarternary nickel-chromium-vanadium, etc., alloys will give way to simpler constituent backed up with more elaborate heat treatments. These practices will certainly survive after the war.

(19) Many minor technical advances are going to be accelerated. As, for instance, greater use of accurate coining operation in the forging field. Or the very interesting building of three new Ferrostan lines, i. e., continuous electrotinned sheet steel for dry packs and certain canning operations. The current operating unit at Gary can handle 32-in. strip at speeds well over 200 ft. per min. Output is on order of 1000 base boxes in 8 hr. About ½ lb. of tin is used per base box, as against 1½ lb. in normal hot dip practice. This is a particularly important development in view of the possible tin shortage and the expanding demands that the tin plate industry will be required to meet.

(20) There probably will be little price change in steel during the war. Perhaps a few extra changes here and there, as for instance the recent $10 extra placed on hot rolled Cr-Mo bar used extensively for armor piercing shells. This steel has a permitted 10-point carbon spread, as against a 7-point spread for similar SAE 4150 steel.

(21) No one really has much of an idea regarding the shift in steel demands in 1942. Certainly the killing off of passenger car production is going to release much flat rolled and alloy steel—but truck and military units are at the same time going to expand tremendously. The only thing sure is that many changes are in prospect. Whether the decrease in civilian production will more than offset increasing

TABLE IV—Approximate Distribution* of Finished Steel in 1941,

	Ingots, Blooms, Billets, Slabs, Tube Rounds, Sheet and Tin Bars	Structural Shapes and Sheet Piling	Plates (Universal and Sheared)	Rails		Tie Plates and Track Accessories Including Track Spikes	Hot Rolled Bars			Pipes and Tubes	Wire Rods
				Over 60 Lb.	All Other		Carbon Including Hoops and Bands	Concrete Reinforcing	Alloy		
Agricultural, incl. impl. and equip. Mfrs	76,560	43,880	36,927	34		8	352,723	596	21,274	229,135	6,744
Aircraft industry	73,634	159,760	43,337	120	100	20	20,028	26,874	65,162	17,084	3,095
Automotive industry	332,168	68,902	306,029	1,692		617	1,141,441	37,527	820,049	402,413	68,657
Construction industry†											
(a) Defense plants, bases, cantonments	75	310,300	116,855	35,703	277	13,137	41,944	330,514	684	121,688	623
(b) All other	40,481	2,423,800	1,705,254	55,133	16,382	17,477	508,441	812,391	18,222	612,837	33,015
Total	*40,556*	*2,734,100*	*1,822,109*	*90,836*	*16,659*	*30,614*	*550,385*	*1,142,905*	*18,906*	*734,525*	*33,638*
Container industry	487	7,434	22,871	65		9	19,092	85	908	2,270	54
Machinery and tools	108,427	255,160	416,694	1,188	4,678	630	463,167	972	103,520	546,321	79,252
Oil, gas, water and mining industry	19,085	43,248	118,816	7,492	50,902	14,025	64,565	7,515	31,606	2,047,165	4,122
Ordnance, projectiles and tanks	59,951	7,012	14,071			140	83,953		50,042	22,460	786
Pressing, forming and stamping industry											
(a) Metal furniture and office equipment	2,933	3,840	3,238	8		5	66,821	221	1,924	17,774	12,762
(b) Hardware and household equipment	787	9,790	8,954				62,048	1,199	4,751	11,820	7,853
(c) All other	2,288	6,453	33,770			3	96,853	5,669	6,495	11,766	25,652
Total	*6,008*	*20,083*	*45,962*	*8*		*8*	*225,722*	*7,089*	*13,170*	*41,360*	*46,267*
Railroad industry	171,331	690,156	1,220,411	1,284,468	28,467	723,629	548,047	19,888	34,007	56,949	4,137
Shipbuilding industry	19,528	711,550	1,385,771	5,578	1,005	1,309	200,901	42,743	12,818	49,589	4,128
Undistributed and miscellaneous industries‡	1,047,787	56,812	156,306	38,082	10,115	40,348	1,545,753	92,877	220,580	619,853	874,166
Export, all industries	2,144,663	236,991	401,859	79,203	40,949	20,302	408,111	214,363	135,232	364,227	183,340
TOTAL	4,100,185	5,035,088	5,991,163	1,508,766	152,875	831,659	5,623,888	1,593,434	1,527,274	5,133,351	1,308,336

* Data from various Government and OPM reports, American Iron and Steel Institute, individual steel companies, and estimates by the author.

† Automotive, aircraft and shipbuilding construction included in respective industry groups.

military needs, only time itself will tell.

OF course everyone's pulse is throbbing today with news of battle and bloodshed, and any discussion of 1941 steel production and distribution could perhaps be classified as so much bathos. But, being a year of contradiction, a year of record production and flabbergasting scarcities, just what did happen to the record 60,000,000 tons of finished steel produced in 1941 is a subject well worthy of detailed examination. And, such examination may well serve as a basis on which to predicate at least a few possibilities and probabilities for 1942.

First, a word about the load thrown on the industry. The graph on pages 50-51, so far as the writer knows has never been developed before. It shows the movement of total backlog of the industry for the period 1937 to 1941 inclusive. Never before in its history have steel makers been subjected to such an insistent and severe climb in unfilled commitments. Look back at the dear, sweet, serene year of 1939, which was so reviled then but looks so desirable now in retrospect. Then the Department of Justice, probing for soft spots in the steel system, turned up the interesting conclusion that capacity was abnormal and constituted an unnecessary load on the body politic. Shortly thereafter came the juicy spurt of English orders, with all business naturally on the basis of cash on the barrel-head. Then that curious lull, that always-apparent lull before the storm, early in 1940 when orders dropped and this country bathed in beautiful isolationism and solved with such facility the economic, political and military problems of the world with shallow analyses and flip remarks. The screws were really biting by early 1941, however, and a cocky industry was hit by orders galore —delayed Christmas presents, or so it seemed to the average salesman who continued to battle for the more toothsome competitive civilian accounts.

But, all makers were confident of ability to meet demands with only a little tightening up here and there, some additional specialized capacity, a few routine manipulations. The first Gano Dunn report, an excellent analysis, justified this attitude. Political events were on the march, however, Europe was disintegrating, the dim outlines of what being an Arsenal of Democracy implied became a little frightening. The shape of the backlog curve didn't break—rather it started getting out of hand. Then, the second Gano Dunn report showing need for more capacity or else a wiping out of certain civilian loads. The second report was in no way a correction of the first, but merely reflected the unpredictable loads imposed in the interim.

Washington became a city of industrial planners and tinkerers, of novices and outsiders setting up orders for the marketing of steel and cooking up elaborate plans for new and revamped production facilities. Steel companies instituted some new capacity construction on their own hook and because of some prodding, and, being somewhat frightened and baffled at happenings in Washington, set up offices of gum shoe artists there to try to find out what the hell was going on.

And still backlogs climbed. Some companies, as for instance, Bethlehem, might find its backlog doubling in the time it takes to sign a shipbuilding contract. It became obvious that the industry could not meet obligations on hand. In the last quarter the curve breaks somewhat as tighter priority controls, the beginning of allocations, limitations on construction, and curtailment policies affecting consumer durables, progressively choked off less essential demands in the interest of defense. But, still the commitment sheet remained pretty heavily loaded. Then came the Hauck plan to lift ingot capacity 10,000,000 tons, with supporting pig iron and bessemer capacity. And with the Hauck plan came the recurrent disputation as to whether such expansion was necessary, desirable, or practicable.

A major argument that capacity additions are not necessary is based on the relatively small amount of steel traceable directly to military use in 1941, and the tremendous quantities going to civilian outlets, with an equal

by Product and by Consuming Industry (In Net Tons)

Wire and Wire Products Including Fence Posts	Black Plate	Tin and Terne Plate (Hot Rolled and Cold Reduced)	Sheets and Strip				Tool Steel Bars	Wheels and Axles	Skelp	Undistributed and All Other	Net Total	
			Hot Rolled	Cold Reduced	Galvanized	All Other						
558,025	263	283	207,005	18,603	126,938	11,786	2,306	.....	462	28,750	1,722,302	Agricultural, incl. imp. and equip. mfrs.
39,210	.....	313	20,171	3,578	3,420	6,642	4,912	24	64	43,980	531,528	Aircraft industry
209,067	5,906	16,702	2,943,347	2,030,012	11,951	207,966	9,006	1,616	2,400	883,832	9,501,30)	Automotive industry
												Construction industry†
93,743	.....	260	91,189	15,148	145,051	788	11	.....	.....	9,342	1,327,332	(a) Defense plants, bases, cantonments
763,657	4,563	12,084	755,125	125,019	531,853	10,602	4,542	3,222	8,531	80,295	8,542,926	(b) All other
857,400	*4,563*	*12,344*	*846,314*	*140,167*	*676,904*	*11,390*	*4,553*	*3,222*	*8,531*	*89,637*	*9,870,258*	*Total*
80,662	214,333	3,043,765	870,076	88,609	40,000	6,064	470	458	.....	31,806	4,429,518	Container industry
116,004	4,641	5,685	511,133	154,966	18,125	256,656	58,434	9,161	7	150,077	3,264,898	Machinery and tools
33,569	1,307	5,114	128,867	1,985	9,752	110	4,360	5,250	173,707	41,892	2,814,454	Oil, gas, water and mining industry
925	.....	1,235	91,592	24,163	875	8,086	4,900	.....	.....	140,628	510,819	Ordnance, projectiles and tanks
												Pressing, forming and stamping industry
79,833	1,205	1,944	120,598	157,016	10,825	11,266	245	.....	.....	9,000	501,458	(a) Metal furniture and office equipment
197,551	90,475	27,498	491,220	629,217	72,000	168,656	1,690	5	.....	25,405	1,810,919	(b) Hardware and household equipment
188,925	51,467	28,980	463,226	214,473	34,825	83,588	601	.....	273	4,850	1,260,157	(c) All other
466,309	*143,147*	*58,422*	*1,075,044*	*1,000,706*	*117,650*	*263,510*	*2,536*	*5*	*273*	*39,255*	*3,572,534*	*Total*
42,196	155	698	418,111	11,628	89,915	6,920	3,912	393,871	52	64,570	5,813,518	Railroad industry
11,041	29	89	97,508	5,029	31,171	1,470	1,975	188	226	225,592	2,809,238	Shipbuilding industry
889,910	22,329	28,756	500,008	139,692	327,048	42,582	20,960	2,618	199,662	2,419,551	9,f03.505	Undistributed and miscellaneous industries‡
272,669	49,325	450,091	383,080	109,769	101,057	20,724	7,083	10,585	136,940	93,275	5,863,838	Export, all industries
3,576,987	445,998	3,623,497	8,092,256	3,728,907	1,554,806	843,906	125,407	426,998	522,324	4,252,845	60,000,000	TOTAL

‡ Includes steel, otherwise impossible to allocate, going to steel converting and processing industries, i.e., wire drawers, bolt, nut, rivet makers, etc.

tremendous tonnage absorbed in that vague intermediate ground that no one can definitely label military or civilian. Thus, cut civilian requirements to skeleton levels, and the country will have steel up to its ears for military requirements. On the other hand, proponements of expansion insist that civilian cuts cannot be safely made in a degree to meet the flood of military demands that are inevitable as the war progresses.

Table I shows the steel delivered (approximately) in December, 1941, by product and by agency ruling the various orders. Table II is a similar breakdown of total unfilled commitments at the turn of the year, also by product and by agency. There is no quibbling with the urgency of tonnages going to Lend-Lease, Army and Navy, OPA and other U. S. agencies. The division of priorities, however, accounts for the bulk of tonnage—this tonnage, its distribution and urgency has been the basis of all difference of opinion.

The bulk backlog shown in Table II is equivalent to about one-half year's production. Indicative of the tremendous pressure on certain products, however, is the 4,586,149-ton backlog for plates, equivalent almost to present capacity for that product. For the most part, however, the forward position doesn't look too discouraging at this writing, although so many things can happen to rapidly distort the picture that even a little complacency is unwise.

To complement the bulk data shown in Tables I and II, an effort is made herein to examine 1941 consumption as to consuming industry and product. To secure these breakdowns it was necessary to tap many widely separated sources of data and juggle with some fancy correlation of the raw basic data. None the less, the feats of prestidigitation are checkable at various points, and it is believed that the overall picture is fairly accurate.

Table III shows a tonnage and percentage breakdown of 1941 consumption by industry, compared with performances of past years. Table IV is a more elaborate breakdown by industry and by product, for the year 1941 alone.

Of course the most surprising figure in both Tables III and IV is the tonnage going to major defense items, as for instance shipbuilding, ordnance, projectiles, tanks, and the aircraft industry. All these items hardly account for 20 per cent of the steel delivered. And, on this basis it would be very easy, and also very foolish, to come to the conclusion that all the difficulty experienced during the year by the industry could be credited to bloated civilian demands. But, a nail going into a cantonment is a war item, a mile of barbed wire on a farm can well be a war item, the retention of a civilian industry just to bolster morale may be a war item, and what good is an airplane motor if there is no railroad car to haul it? Just where the line is to be drawn between a definite war demand and an unnecessary civilian demand is something so many people profess being able to answer but in all truthfulness no one can answer—it can only be experimented with on a cut and try basis.

One definite civilian item, however, is the automobile. This industry has all year been subjected to the bitterest criticism, and lately to the most severe restrictions, primarily because it is an enormous consumer of steel, and particularly of the steels so needed by various armament industries. It is hard to deny that the automobile industry went a little hog wild during 1941, chalking up almost record productions and sending the units along to the public on the wave of high pressure selling, frequently based on the fears of the buyers concerning future inability to obtain cars. On the other hand, all too many people have recklessly advocated wiping out the industry during the year with no particular concern for the hardships such action would naturally impose upon hundreds of thousands of workers. It is to be regretted that the whole problem was not handled more intelligently, with the industry being cut down gradually and workers being absorbed in nearby war industries.

The most conspicuous item in Tables III and IV is the 9,501,300 tons of steel going to the automobile industry during 1941, accounting for 15.9 per cent of the country's total steel, being considerably under the 1940 participation of the industry in the steel market. Defense (or war) work absorbed by the automobile industry was about ½ per cent in January, 1940, gradually increasing month by month to 20 per cent in the last quarter of 1941. In 1940 the automobile industry accounted for 7,689,000 net tons of billets, bars, strip, plates, structural, etc., and alloy (alloy, 8.8% of total) for passenger car units, trucks, buses, etc. During the same year only about 206,600 tons of steel went to war items such as troop transports, scout radio cars, jeeps, half tracks, etc. In 1941 civilian cars and trucks accounted for about 7,962,000 tons of steel, and defense units accounted for 1,413,000 tons. In either 1940 or 1941, apparently about 69,923 and 126,300 tons respectively, went into munitions, tanks, marine and aviation engines, etc.

An examination of the product distributions in Table IV for the year 1941 brings forth some interesting points.

Ingots, billets, etc.—export accounted for over half of the tonnage in this group, reflecting of course England's tremendous need for steel in this semi-finished form. The automobile industry chewed up a good quantity, and tonnage going to ordnance was comparatively insignificant.

Structural shapes — the construction industry, much of it not traceable directly to the war effort, took over half the tonnage in this group. Railroad and shipyards accounted for over one-quarter. Ordnance, again, shows up as of little moment.

Plates—this is the product in which tightness has been so conspicuous late in 1941, and the first put under strict allocation. The railroad, shipbuilding and machinery outlets took over half the available plates. Construction was the largest single outlet, with the bulk of material in this group going (mostly early in 1941) to municipal buildings, utilities, highways, and a great mass of miscellaneous uses impossible to trace. Both Lend-Lease and the automobile industry accounted for major tonnages.

Hot rolled bars — the automobile industry was the great outlet in this group, dominating both the carbon and alloy groups. Surprisingly little steel was taken by the ordnance and aircraft groups. Railroad and shipyards, together, accounted for on the order of 11 per cent of the total (excluding reinforcing bars).

Pipe and tubes—here, as usual, the oil, gas, water and mining group dominate the picture. Again, it is surprising how small an amount has gone to ordnance—the

large production of aircraft bombs must in part show in the miscellaneous group.

Wire and wire products—agriculture as usual dominates this group, with the automobile industry and miscellaneous stamping and forming industries accounting for large quantities. War industries account for little tonnage.

Tin plate — naturally, nothing else is of much importance in this group but the container industry. If anything, 1942 will show a more than proportional rise in tin plate, as it becomes necessary to ship more food long distances to the armies of the anti-Axis world. Lend-lease alone is expected to take 930,000 net tons of tin plate in 1942, which is over 20 per cent of the industry's capacity. In view of the demands on lead and the always critical position of tin, it has been astonishing the amount of tin plate still going into beer cans, certain foods (baby's, for instance), cigarette tins, etc., or terne plate going into oil cans. All these uses are readily transferrable to the glass or paper industries.

Sheets and strip — Automotive, construction, miscellaneous forming and stamping, and containers blanket this field. Many observers contend that some of this capacity can be transferred to plates, and already a little of this shift has taken place. Undoubtedly some of the civilian outlets can be cut considerably, but how much no one can prophesy. In any case the continuous mills supplying these steels will have to work more on plate and tin plate breakdown in 1942 which may tend to offset some gains in this section.

Tool steel bars—about half goes to machinery and machine tools, about 5000 tons went to aircraft, an equal amount to ordnance, and approximately twice as much to automobiles.

In most of these product classifications, the automobile industry assumes a very prominent position. Therefore, it is assumed that with civilian auto assemblies scheduled for almost complete cancellation by February, a great quantity of steel can be made available for other more pressing uses. None the less this is only part of the picture. Most likely at the same time there will be a concurrent rise in truck assemblies for replacement and military use, along with great rises in steels going into all the multitude of rolling stock demanded by a mechanized army in field campaigns in far corners of the world. There is a suspicion in many quarters that the net amount of steel made available for other uses will fall short of rosy expectations.

MOST informed steel analysts and even certain government agencies make no bones about their belief that any attempt to lift ingot capacity an additional 10,000,000 tons over the next 18 months will be not only a dangerous but a futile gesture. This because there will be insufficient pig iron and scrap resources to support such additions. In fact, it has literally become practically a proven fact that scrap collections next year may drop as much as 5,000,000 tons, and there is any amount of money available in the industry to bet that total ingot production in 1942 will not hit 85,000,000 tons.

It is startling to hear such doubts of the raw material situation, in a country so lavishly blessed with the materials of steel making. Compared with any other country, the physical position of the United States is perfection itself. Thus, the conclusion is inevitable that some difficulties, when and if they arise, will be the result of blundering half measures and ineptitude in planning. No historian will ever be able to set down the day-to-day frustrations, politics and delays that have so long characterized the pig iron program and to some extent the scrap setup. And, of course, steel makers themselves have been too long spoiled by a plenitude of materials and are finding it difficult to develop the ingenuity frequently shown in certain other countries. To the writer's mind, it is a safe bet that before this war is over, steel makers will be making steel, and good steel at that, out of materials never before shoved into an American blast furnace or open hearth. In steel making, like anything else, what can be done depends a great deal on how badly it needs to be done or how badly individuals can be frightened into doing something.

For the sake of simplicity, the raw material situation (for ingot production) breaks down into three parts:

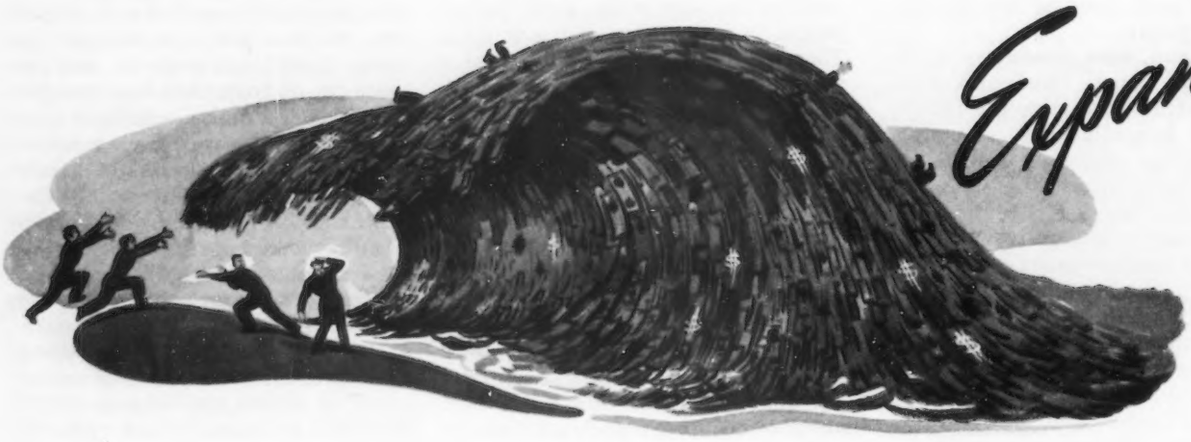
(1) Iron ore
(2) Scrap
(3) Pig Iron

The iron ore position is not particularly severe, at least so far. Shippers really tightened up schedules during the past season, wiped out many a little inefficiency in upper Lake loading docks, and got more ore on boats than they thought was possible. All this, combined with exceptionally favorable weather throughout the season and a late freeze-up (and the help of a few Canadian boats), resulted in a record Lake movement during the 1941 season — some 80,116,360 gross tons, as against the previous 1929 record of 65,204,600 tons. Present stock at lower Lake ports is 45,000,000 tons, as against the previous record stock of 44,004,000 tons in 1922. But, this situation is not quite so sweet as it appears. Ore consumption this winter will be exceptionally heavy, and a late break-up of ice next spring could well cause much loss of sleep. It would be possible to bring down more ore by rail, however, if someone would write off the expense involved. And, another factor to cause concern is interference with Bethlehem ore movements from Chile. All in all, the ore situation is not too serious, but some slips could well demand some drastic corrective actions. The country may yet see huge piles of tinned and galvanized scrap, and enameled pots and pans, beside blast furnaces. Such sights were common in pre-war Germany, and who can deny that Adolf got some pretty good war machines thereby.

As regards scrap, the writer with clammy palms and considerable trepidation takes the position that the situation might possibly be painted far blacker than it really is. Here, definitely, is a problem requiring a little realistic action out of OPM. Of most pressing importance is an immediate pulling in of some excess scrap to tide the steel industry through the February bad weather—a month which usually shows a fall-off in scrap collection and preparation. This added immediate flow could come through selective price action to pull in at least some remote material.

For the long pull, the situation calls for less gloom and more action. Of course, mills are going to be using scrap hitherto sneered at, before this war is over. Already, mills have adapted themselves somewhat to this condition, for when there is not enough cream to go around, skimmed milk tastes pretty good. Real industrial No. 1

(CONCLUDED ON PAGE 159)



Expansion

By T. C. CAMPBELL
Pittsburgh Editor, The Iron Age

STEEL making facilities were not fully engaged as the year closed, due to lack of raw material, but construction on government inspired and government financed steel ingot expansion was being pushed—a situation which some think is paradoxical.

Steel output has been below rated capacity for weeks, owing to scarcity of scrap and pig iron. Late in December the scrap shortage was becoming more serious and plans were shaping up whereby defense needs would be taken care of, in case of scrap shortages, at the expense of ingot output not engaged on rated armament business.

More than 6,600,000 tons of additional annual pig iron capacity have already been approved under government sponsorship. Most or all of this contemplated estimated tonnage is for the purpose of protecting existing steel capacity (rather than supplying pig iron for additional steel ingot capacity already approved) by making up an anticipated deficiency in scrap collections over the next few years.

Some relief was obtained towards the last of the year when Bethlehem Steel Co. and National Steel Corp. each brought in two blast furnaces, thus enabling both companies to add substantially to their supplies of metallics. Early this year Carnegie-Illinois will have enlarged one of its Carrie furnaces and Tennessee Coal, Iron & Railroad Co. will have in operation a new furnace, while American Rolling Mill is expected to be making pig iron in a new furnace at Ashland by June or July, 1942. Several rebuilding jobs and some new privately financed additional furnaces are expected to be completed by the end of 1942 or early 1943.

Up to Dec. 20, 1941, the Defense Plant Corp. had approved the construction of approximately 6,620,000 net tons of pig iron capacity to be built at government expense and to involve about 18 new blast furnaces. By the latter part of December some of these furnaces were in the preliminary stages of construction, while most were in blueprint stage only.

Latest word indicates that the OPM has recommended, and Defense Plant Corp. is expected to approve, additional blast furnaces which, it is assumed, will take care of increased government financed steel capacity expected to be completed by fall of 1943 or early 1944 and which will make a total of about 32 furnaces approved or recommended since expansion plans were set up. In this connection it is also expected that OPM will recommend, and DPC will approve, additional steel ingot capacity over and above what has already been approved, but only as it is deemed necessary since action will be concentrated on projects already approved.

More important than the actual construction of blast furnaces, however, is the absolute necessity for providing boat space to carry iron ore down so that these contemplated new furnaces may operate. At the present time, U. S. Steel Corp. has under construction five new ore boats but progress on the 25 ore boats which were projected and approved by the government to take care of the increased pig iron capacity has been slow. So far only 16 have been ordered by the Maritime Commission. It is believed on good authority that construction on none of these has been started, or if it has, nothing tangible has yet been accomplished.

In view of the heavy demand for Naval and Maritime plates and in view of the certain increase in such requirements, there appears, according to reliable information, a chance that enough of these ore boats will not be completed in sufficient time to furnish ore to the new blast furnaces unless a definite and unalterable plan of action is immediately instituted. OPM has given material high military preference ratings but it needs more than this to assure completion on time, according to informed opinion.

Even assuming the hurdle of new ore boats is overcome, the next question which arises is how fast the steel will be available for the 18 government sponsored blast furnaces. Including the latter plus a few privately financed blast furnaces expected to be built, approximately 120,000 tons of steel, mostly plates, will be required. With the Army, Navy and Maritime Commission already demanding more

Uncertainties Plague Producers

plates than are actually being produced, definite and concrete action in the way of allocations is also indicated here if these blast furnaces are to be completed by the end of 1943 or early 1944.

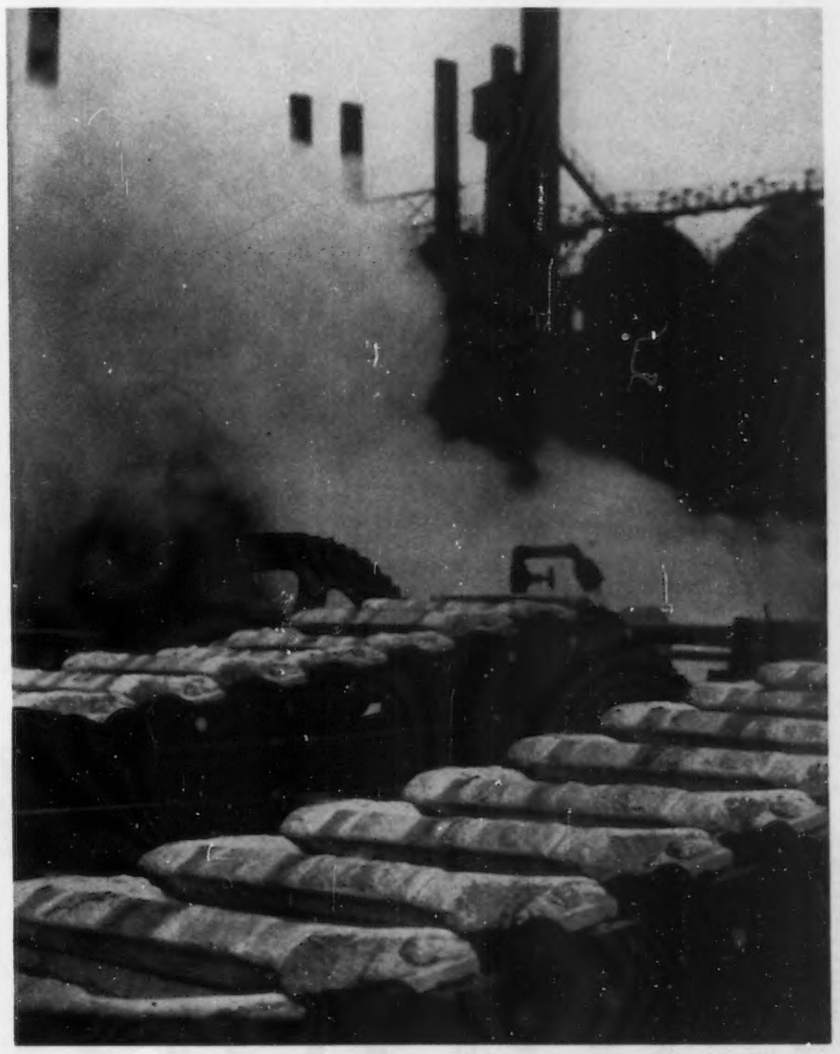
With the clamps already down on expansion information, it is nevertheless believed that as far as possible some positive action other than preference ratings will be taken to protect the ore boat and the blast furnace building programs. If this is not done, responsible steel engineers see a likelihood of some open-hearths and blast furnaces being practically completed before actual facilities for feeding them raw materials are anywhere near ready.

In a measure the government sponsored, approved increases in steel ingot capacity amounting to approximately 4,700,000 tons up to Dec. 20 are also expected to face hurdles on the time of completion because of the step-up in defense and war steel requirements. It is not to be inferred from this, however, that present steel capacity is not adequate to take care of defense needs. As a matter of fact, as of the end of the year and counting the privately financed ingot capacity which will be in operation by next June, there is sufficient steel making capacity to take care of any war plans the country might have, according to reliable authorities.

For example, at the end of June, 1941, steel making capacity in the industry amounted to approximately 86,150,000 tons. By the end of June, 1942, privately financed additions to ingot capacity will amount to 2,731,000 tons, which would give the industry a total steel making capacity at that time of 88,881,000 tons, and if approximately 316,000 tons of government-financed expansion is completed by that time, the industry will have at its disposal, 89,197,000 tons of capacity. If steel operators could be assured of scrap and pig iron to take care of 89,000,000 tons of steel ingot capacity by next June, they would feel much happier than they have in the past few weeks.

• • Approved plans and paper plans, good plans and foolish plans—everything but an over-all correlated plan.

However, realizing that the seriousness of the situation is something that cannot be gambled with, there has been no hesitancy in steel companies going along with government expansion of steel ingot



IF more of these pig casting machines were running today, the steel industry would not be so concerned about the tightness in scrap. Until 1943, blast furnace capacity will be pushed hard to take care of open hearth expansions.

TABLE I

Iron and Steel Expansion at a Glance
(Thousands of Net Tons)

Period	Pig Iron Capacity Expansion			Steel Capacity Expansion: Open Hearth and Bessemer			Steel Capacity Expansion: Electric			Steel Capacity Expansion: Total		
	Privately Financed	Government Financed	Total	Privately Financed	Government Financed	Total	Privately Financed	Government Financed	Total	Privately Financed	Government Financed	Total
July to December 30, 1941	2,811	0	2,811	1,359	0	1,359	264	144	408	1,623	144	1,767
January 1 to June 30, 1942	1,100	0	1,100	991	0	991	117	316	433	1,108	316	1,424
July 1, 1942 and later	822	6,620**	7,442	250	3,993***	4,243	0	287	287	250	4,280	4,530
Total additions	4,733	6,620	11,353	2,600	3,993	6,593	381	747	1,128	2,981	4,740	7,721
Plus capacity as of June 30, 1941	.....	.....	56,989	.....	.....	82,873	.....	.....	3,277	.....	.....	86,150
Total estimated future capacity	.....	.....	68,342	.....	.....	89,466	.....	.....	4,405*	.....	.....	93,871

* Private sources estimate electric capacity in future as 5,000,000 net tons because of new projects now under discussion.
** Includes one furnace recommended but not yet authorized.
*** Includes West Coast project approved but not announced when this report was made.
Note: The above statistics are conservative estimates made by THE IRON AGE, as of Dec. 20, 1941, based on reliable information concerning privately and government financed projects. All have been approved except as indicated in above notes. Pig iron estimates are for pig iron only and are more conservative than some Washington figures. Unallocated but reasonably sure are additional blast furnaces to be built but not shown above.

capacity, with the result that by the end of 1943 or some time in 1944, the rated steel ingot capacity of the nation is expected to approximate 94,000,000 tons. If the original 10,000,000-ton expansion recommended by OPM is fully approved, the future ingot capacity of the country will approximate 100,000,000 tons, a figure which a few years ago would have startled even the most imaginative.

Assuming that the present government approved expansion plans (approved as of Dec. 20, 1941) continue as now set up, a breakdown of the various steel operating districts indicates that no major changes can be expected in the percentage participation of each district to the total capacity in the country. Projecting all present approved programs, the major steel producing areas like Pittsburgh, Chicago, Valleys, and Philadelphia show little change from June, 1941, in the per cent of their capacity to the total capacity in the country. Major changes percentage-wise, however, are found in the Western part of the United States but not from the standpoint of tonnage when compared with total capacity of the country.

This analysis, however, could be materially changed if the position is taken that older equipment might be retired after the war in favor of the new installations which were put in from July, 1941 to 1944. In all Defense Plant Corp. capacity additions is the provision that the steel companies operating them have the option of buying the plant at a price to be determined later (at the end of five years). If such a policy prevailed, some of the older districts such as Pittsburgh would find its capacity drop in relation to total capacity since a number of older units in the steel industry which loom large in the Greater Pittsburgh area might be scrapped. Hence the projected capacities in table No. II are to be studied with that reservation in mind and they only give the picture on the basis that all present capacity is still existent with new capacity to be brought in.

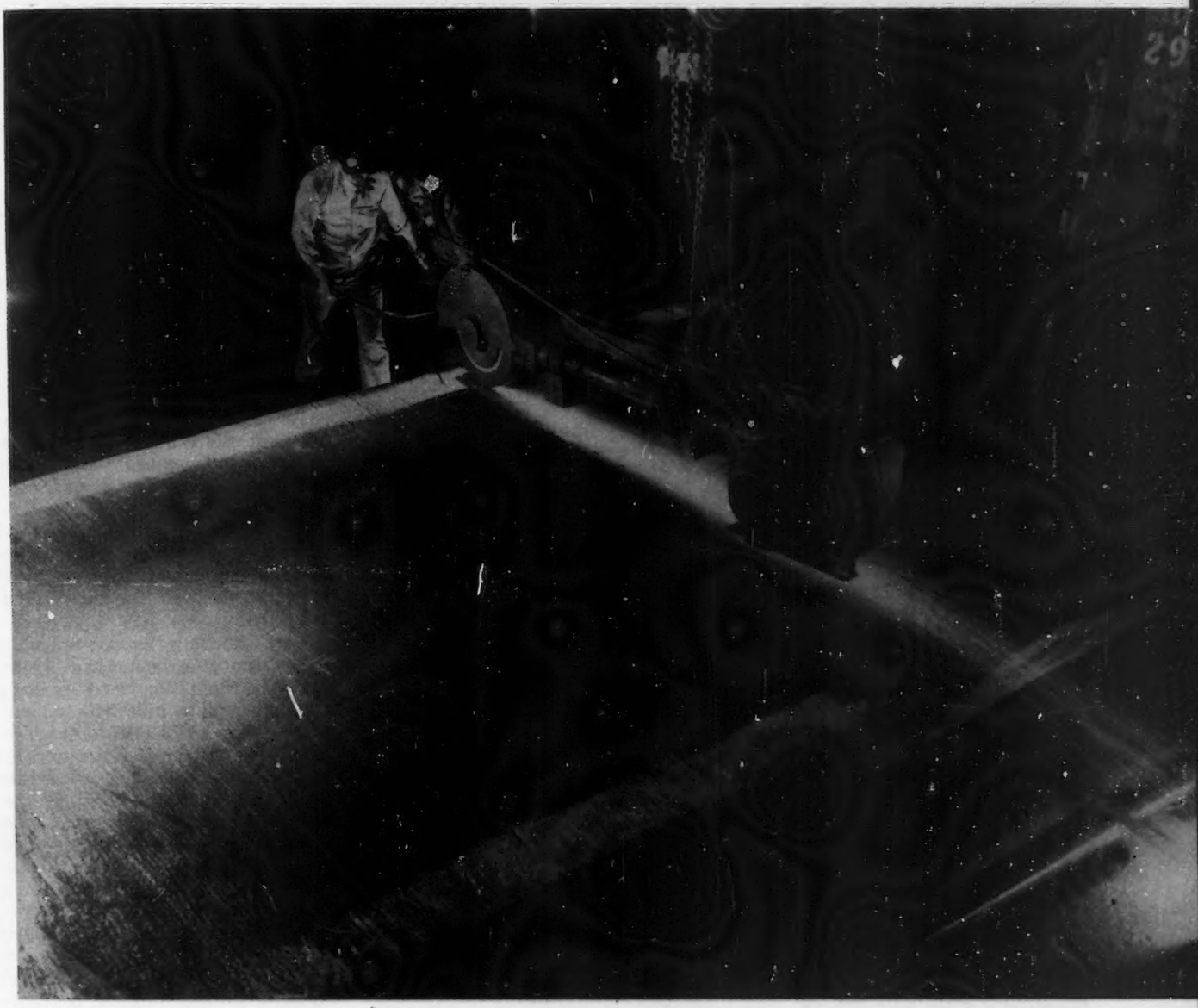
It is evident from a breakdown in pig iron capacity by districts that very little change is indicated in the relative position of the various districts to total pig iron capacity, assuming present approved plans go through to completion. It is apparent, however, that the contemplated increases in pig iron capacity do not necessarily coincide with the increases in steel ingot capacity on a relative basis. Theoretically, however, this would not be expected since it is believed the government sponsored pig iron expansion will take care of shortages throughout the country, regardless of area in which they might arise.

TABLE II

Estimated Increase in Annual Steel Capacity by Districts
(Including Private and Government Approved Programs — Thousands of Net Tons

District	June 30, 1941				Dec. 31, 1941				June 30, 1942				1942 to 1943 and later			
	O. H. and Bessemer	Electric	Total	Per Cent of Total	O. H. and Bessemer	Electric	Total	Per Cent of Total	O. H. and Bessemer	Electric	Total	Per Cent of Total	O. H. and Bessemer	Electric	Total	Per Cent of Total
Pittsburgh	19,513	583*	20,096	23.3	19,513	621	20,134	23.0	19,513	637	20,150	22.6	21,503	761	22,264	23.8
Chicago	16,543	417	16,960	19.7	16,739	477	17,216	19.5	17,229	477	17,706	19.8	17,229	597	17,826	19.0
Valleys	11,020	1,153	12,173	14.1	11,020	1,297	12,317	14.0	11,020	1,613	12,633	14.1	11,020	1,613	12,633	13.4
Philadelphia	10,052	403	10,455	12.1	10,686	444	11,130	12.6	10,710	444	11,154	12.5	10,940	444	11,384	12.1
Cleveland	4,484	7	4,491	5.2	4,484	7	4,491	5.1	4,484	7	4,491	5.0	4,484	7	4,491	4.8
Buffalo	4,363	70	4,433	5.2	4,363	70	4,433	5.0	4,363	70	4,433	4.9	4,363	70	4,433	4.7
Wheeling-Weirton	3,737	....	3,737	4.3	4,006	....	4,006	4.6	4,006	....	4,006	4.5	4,006	....	4,006	4.3
Southern	3,311	65	3,376	3.9	3,311	65	3,376	3.9	3,711	101	3,812	4.3	3,711	101	3,812	4.1
Detroit	2,743	325	3,068	3.6	2,918	340	3,258	3.8	2,918	340	3,258	3.7	3,118	340	3,458	3.7
South Ohio River	2,808	8	2,816	3.3	2,808	8	2,816	3.2	2,808	8	2,816	3.2	2,808	51	2,859	3.0
Western	2,235	84	2,319	2.7	2,235	158	2,393	2.7	2,312	223	2,535	2.8	4,135	223	4,358	4.6
St. Louis	1,532	....	1,532	1.8	1,602	....	1,602	1.8	1,602	....	1,602	1.8	1,602	....	1,602	1.7
Eastern	532	162	694	0.8	547	198	745	0.8	547	198	745	0.8	547	198	745	0.8
Total	82,873	3,277	86,150	....	84,232	3,685	87,917	....	85,223	4,118	89,341	....	89,466	4,405	93,871	....

* Includes small amount crucible steel capacity.
Note: Data are THE IRON AGE estimates, as of Dec. 20, 1941.



GRINDING out imperfections in heavy armor plate, at the plant of the Bethlehem Steel Co. All plate must be carefully conditioned before reforging into armor.

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In other words, most of the increased pig iron capacity fostered and financed by the government was probably placed in as central a location as possible with respect to anticipated shortages of metallics. This situation is apparently correct during a war time emergency but after the war is over it might conceivably bring about a dislocation in the normal balance between pig iron supplies needed for open hearth requirements.

While every steel man today is unequivocally in favor of and is doing his best to continue all-out production for defense and war purposes, he does have in the back of his mind some ideas as to what might occur after the war as a result of present government sponsored expansions.

The major fear, of course, is that of over-expansion. This might be mitigated by the retirement in peacetime of some facilities which, under ordinary conditions, would have been abandoned by now. Nevertheless, the specter of overcapacity with respect to a given demand, is causing some steel company executives to have nightmares, even though during the daytime they are bending every effort and producing the unbelievable in production records.

Questions such as the following present a cross-section of current thought on the "aftermath."

(1) Under the present price setup, which is relatively satisfactory because of tremendous volume, what will happen to some steel companies' financial position when steel operations drop to 50 per cent or less?

(2) With wage rates already established at an all-time high and with unions accepted as a permanent setup, what measures will or will not be taken by the government in order to forestall tremendous financial loss when a real era

A summary of the more important private and government sponsored expansions which have been mentioned from time to time are as follows:

RECENTLY COMPLETED—Bethlehem Steel Co., 672,000 tons of pig iron capacity and 540,000 tons of open-hearth steel capacity; National Steel Corp., 743,000 tons of pig iron capacity and 450,000 tons of open-hearth steel capacity. Both of these projects were privately financed.

UNDER CONSTRUCTION—Private: Tennessee Coal, Iron & Railroad Co., 400,000 tons of open-hearth steel ingot capacity; Carnegie-Illinois Steel Corp., 300,000 tons of open-hearth steel capacity at Gary; Columbia Steel Co., 77,000 tons of open-hearth steel capacity.

UNDER CONSTRUCTION—Government: Republic Steel Corp., 216,000 tons of electric steel; Copperweld Steel Co. 100,000 tons of electric steel.

APPROVED — Government: Carnegie-Illinois Steel Corp., Pittsburgh district, 1,740,000 tons of open-hearth steel; 100,000 tons of electric steel; Columbia Steel Co. 870,000 tons of open-hearth steel; Youngstown Sheet & Tube Co., 120,000 tons of electric steel; Bethlehem Steel Co., 180,000 tons of open hearth steel; Sheffield Steel Co., 305,000 tons of open-hearth steel; American Rolling Mill Co., 43,000 tons of electric steel.

NEW BLAST FURNACES APPROVED AND ANNOUNCED BY THE GOVERNMENT—Republic Steel Corp., four blast furnaces, 1,400,000 tons; Columbia Steel Co., four blast furnaces, 1,450,000 tons; Bethlehem Steel Co., three blast furnaces, 1,300,000 tons; Sheffield Steel Co., one blast furnace, 245,000 tons; Carnegie-Illinois Steel Corp., two blast furnaces 800,000 tons; Inland Steel Co., two blast furnaces, 900,000 tons.

of competition engendered by large capacity sets in?

(3) Just what disposition will be made of the pig iron and steel capacity increases which have been financed by the government? Will they be locked up, kept going at government expense, thus competing with private business, or will they be auctioned off, lock, stock and barrel?

(4) Just as hand mills have given way to wide strip mills in the past several years, will some of the older plate mills face extinction because of the greatly increased modern plate capacity which is part of government expansion programs?

(5) With the generally accepted basing point price system, which produces the lowest delivered price to the consumer based on the nearest basing point for the product in question, having been altered to allow for a freight absorption by the consumer on tonnage dislocated because of the defense program, will the "aftermath" see a return to the regular established selling practice or does the specter of f.o.b. mill prices already cast its shadow for the future?

(6) With so-called published prices theoretically in effect after the war, will waves of competitive selling bring actual realized prices down to $5 to $8 a ton on some products and if so, what will some steel companies use for money in order to stay in business?

It is a tribute to steel men who have been buffeted around that despite these severe nightmares, they are producing and will continue to produce more steel than any other nation or coalition of nations in order to maintain a freedom of action which exists in few places in the world.

For that same reason, steel companies throughout the past year or more, at their own expense, have installed or enlarged blooming mills, have expanded and pushed to the hilt wide strip mill production, in order to take care of plates, and have in general maintained all facilities so that failures and breakdowns have been conspicuous by their absence.

Steel operators are also prepared to perform this same type of efficiency on the 132-in. modern semi-continuous plate mill with an annual capacity of 780,000 tons, which has been approved for erection by the government at Sparrows Point, Md., and has been leased to the Bethlehem Steel Co. The same type of trusteeship will run to capacity when they are completed: The blooming mill and 120-in. plate mill at Columbia Steel Co.'s Provo, Utah, plant; the slabbing mill and 160-in. plate mill at Carnegie-Illinois Steel Corp.'s Homestead works; and the blooming mill and 120-in. plate mill to be constructed at American Rolling Mill's subsidiary plant, Sheffield Steel Co., at Houston, Tex.

In addition to these government sponsored projects which have been approved, Republic Steel Corp. has recently completed changes at its Cleveland wide strip mill to take care of a substantial increase in plate production, while the Great Lakes Steel Co. at Detroit will soon have expanded its wide strip mill to step up plate production considerably. Some time in March or April the Tennessee Coal, Iron & Railroad Co. at Birmingham will have a new 140-in. plate mill and other finishing capacity in operation.

It is expected that additional programs will soon be approved towards rebuilding and rearranging present wide strip mills in or-

TABLE III

Estimated Increased Annual Pig Iron Capacity by Districts (Including Private and Government Approved Programs — Thousands of Net Tons)

District	June 30,1941 Capacity	June 30,1941 District Per Cent of Total	Dec. 31, 1941 Capacity	Dec. 31, 1941 District Per Cent of Total	Sept. 1, 1942 to Late 1943 Capacity	Sept. 1, 1942 to Late 1943 District Per Cent of Total
Pittsburgh	14,075	24.6	14,255	23.7	15,841	23.2
Chicago	12,505	22.0	12,891*	21.5	14,323	21.0
Valleys	6,890	12.1	6,890	11.4	7,390	10.8
Philadelphia	5,153	9.1	5,612	9.3	6,704	9.8
Cleveland	4,802	8.4	4,845	8.1	5,895	8.6
Buffalo	3,660	6.4	3,900	6.5	4,332	6.3
Wheeling-Weirton	2,417	4.2	2,817	4.7	2,817	4.1
Southern	3,689	6.5	4,039*	6.7	4,319	6.3
Detroit	1,366	2.4	1,716	2.8	2,066	3.0
South Ohio River	1,281	2.3	1,694*	2.8	1,694	2.5
Western	740	1.3	824	1.4	2,294**	3.4
St. Louis	.....	....	256	0.4	256	0.4
Eastern	411	0.7	411	0.7	411	0.6
Total	56,989	....	60,150	....	68,342	....

* One furnace each in these districts included which are erected to produce about June or July, 1942.
** Includes one furnace recommended but not yet authorized.
Note: In addition to the above private and government approved capacity, several additional furnaces not yet allocated will be built. Data above are THE IRON AGE estimates as of December 20, 1941.

der to produce a greater tonnage of plates. While it seemed apparently impossible a few years ago, many wide strip mills today which were optimistically rated at 600,000 to 700,000 tons of sheets a year, have on many occasions produced between 85,000 and 98,000 tons of flat rolled material in a single month. It is estimated by steel mill engineers that all large wide strip mills in existence today can consistently turn out in excess of 1,000,000 tons of flat rolled material in a year, providing a backlog of orders is in prospect.

Summing up the entire expansion question, there are many sincere and patriotic steel mill officials and engineers who believe that if raw materials are not furnished in sufficient quantities to engage present facilities to their utmost, this phase should be taken care of before any large scale program of steel plant expansion gets under way.

Or at least some actual and coordinated provision should be made to take care of present and future requirements simultaneously. Such a method, it is said, would not leave a possibility that additional blast furnaces and open hearths, new and modern in every respect, might remain idle within the next few years because proper provisions have not been taken to insure beyond *any doubt* that raw materials would be available. While assurances have been given that ore boats and other transportation facilities will be ready on time, such assurances to date do not take care of all doubts including adverse weather, sabotage, unavailable ship ways, preference of Army and Navy requirements and other strategic factors.

STEEL producers no longer are indifferent to the lowly bessemer. Many new units are going in to support large open hearth capacity additions.

Statistical Note

All data shown in these tables and story are as of Dec. 20, 1941. It is expected that since that time several additional blast furnaces will have been approved and that additional steel making facilities will be approved and demanded by the government. The further additions expected soon in steel making facilities will be electric steel capacity in the main. Practically all the basic data used in the attached tables and analyses was taken from governmental reports and releases. In all these cases the writer found it necessary to revise some of the figures appearing in such reports so that they conformed more nearly to generally accepted standards.

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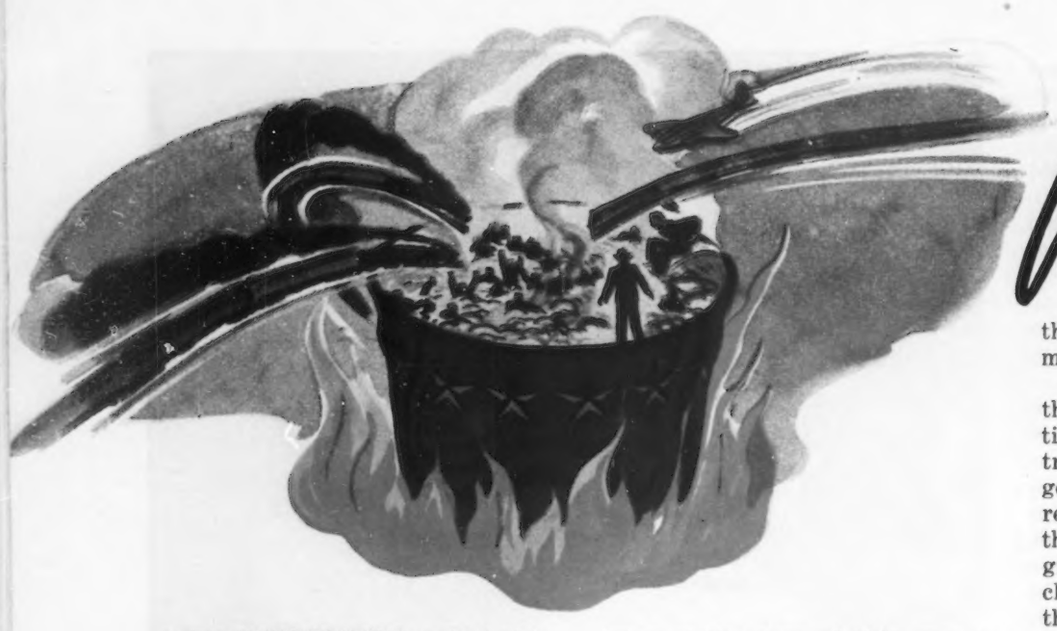

Washington L

GOVERNMENT control of industry through a constantly expanding network of defense agencies reached a new high level in the United States during 1941.

Federal agencies were set up to direct the production and distribution of many raw materials and finished products so that more planes, ships, tanks and guns could be built. Powers of some existing agencies were increased.

In many parts of U. S. industry, such as that making steel, maximum prices were established by the government. Wage restrictions were established on a national and state basis. Taxes were broadened and sharply increased.

For another 12 months, the trend toward stronger control of industry by the federal government moved steeply upward.

But, for the first time in a decade of conflict between management and union leaders, between political groups, between economic and geographical classifications which make up America, the issue was not social reform. It was defense.

Invasion of nearly all of Europe by Germany and the increasing power of the anti-democratic nations throughout the world forced the United States into speeding up the defense program started in 1940.

In the last month of 1941, the United States was fighting desperately on land and sea in a survival for its life. And one of the first steps was to drop out of its language the negative word "defense" and substitute the more positive words "fight" and "war."

The new World War, everyone knew at the close of 1941, was to be one of production. It was up to the metalworking industries, the manufacturers of steel, machine tools, the aircraft plants and shipyards, the automobile factories and other civilian plants forced to convert their production to the needs of war.

The story of the national defense agencies and how they grew, the public and private disputes between business men and social reformers with whom they worked side by side at Washington, the basic controversy over whether more rigid government controls of industry were part of a plan to socialize industry, or help the friends of the U. S. to win the war, was a crazy tangle for most of 1941.

The poorly defined responsibilities of most of the defense agencies, doubt as to how fully some of the agency chiefs would be supported by the administration, and natural resistance to threats against "business as usual" for U. S. industry, were among the factors holding the defense program to a slow pace during the early months of 1941. The agencies had little success in 1941 in stopping defense strikes.

One of the phenomena of this period was the speed with which business leaders taking defense posts accepted the President's views that the U. S. was already in great danger.

At the top of the defense agencies at the start of 1941, as now, was the President. Under the President were the normal Departments of War, of the Navy, of the Treasury and the others. Also just under the President at the start of 1941—it was established May 25, 1940—was the Office for Emergency Management.

From the beginning, the field of the OEM was broad and its functions rather general, so that industry regarded it as another of the government departments which in reality would have little to do with the actual defense production program. The OEM's functions were chiefly to maintain liaison between the President and the national defense agencies for the purpose of obtaining full utilization and coordination of agencies and facilities in meeting the "threatened" emergency. Up to the declaration of war on the United States by Japan (Dec. 7) and by Germany and Italy (Dec. 11), the Office for Emergency Management had 18 months in which to make a record of accomplishment in preparing the nation against the "emergency" threats to its safety.

Among the many divisions set up under the OEM (shown in the National Defense Chart on the following pages) is the National Defense Mediation Board, an 11-man body representing the public, employers and organized labor. The board was organized to stop defense strikes which had gotten far beyond the power of the Department of Labor and the National Labor Relations Board to control, but itself was nearly wrecked late in the year when its two labor union members resigned following the board's 9-to-2 vote against imposing the closed shop on the captive coal mines (a vote upset later by a decision of the Coal Arbitration Board).

By far the most important of the agencies nominally under the Office for Emergency Management is the Office of Production Management, the famed two-headed department directed by William S. Knudsen and Sidney Hillman; the first an outstanding industrial production man, president of General Motors Corp., who was drawn into that high post and the unfamiliar whirlwinds of Washington politics for reasons of patriotism, and the second a man of considerable standing in some elements of the organized labor movement.

LINEUP FOR WAR . . .

By J. A. ROWAN
News and Markets Editor, THE IRON AGE

• *Industry looks at our defense agencies—after Pearl Harbor—and seeks to determine their functions in the total war of production.*

The OPM began its tumultuous life on Jan. 7, 1941, with the stated objectives of "formulating and executing in the public interest all measures needful and appropriate in order (1) to increase, accelerate and regulate the production and supply of materials, articles and equipment and the provision of emergency plant facilities and services required for the nation's defense, and insure effective coordination of those activities of the several departments, corporations and other agencies of the government which are directly concerned therewith."

Rating with the Office of Production Management in importance to industry is the Office of Price Administration, created April 11, 1941, to combat inflation which many U. S. leaders long have feared. To head the OPA, President Roosevelt appointed Leon Henderson.

By August of last year, it was apparent that the defense program was bogging down. Not enough people believed that the country was in danger and that the need of its allies was great enough to demand any significant sacrifice by the U. S. From many quarters came complaints that the defense program had no head, that no one had the authority to compose the conflicting views of some defense agency leaders as to how the job should be done.

On Aug. 28, 1941, President Roosevelt sought to give the defense program stronger direction by appointing the 7-man Supply Priorities and Allocations Board, with Donald M. Nelson as its executive director and Vice-President Henry A. Wallace as chairman. Creation of SPAB ended the overlapping of authority over allocation of civilian supplies that had existed between the OPM and the OPA. The new super-defense board was a policy-making organization, the actual working out of the defense program being left to the OPM and its many divisions such as the important Iron and Steel Branch of the Materials Division.

Whether any of the defense agencies from the Office for Emergency Management, the Supply Priorities and Allocations Board, the Office of Production Management and the Office of Price Administration could harmonize the needs of defense plants and civilian industry, maintain the necessary flow of vital materials to the Army and Navy through the private and government owned defense plants, arsenals, shipyards, munitions plants, and solve the many problems of preparing the U. S. for a long hard war, was still a question at the end of 1941.

Stronger central control of industrial production similar to that of the War Industries Board in the first World War, seems likely, with some of the present pre-war agencies surviving.

A study of the principal defense agencies at the close of 1941 shows how they were operated or were intended to be operated, and gives some indication of their chances for survival during the vastly greater pressure of wartime conditions.

OFFICE FOR EMERGENCY MANAGEMENT — Established May 25, 1940, by President Roosevelt, the OEM is a coordinating agency that operates wholly through its various divisions, with the two principal duties of assisting the President in the clearance of information on defense measures and maintaining a liaison between the President and the defense agencies. The OEM office is at the State Department, Washington.

SUPPLY PRIORITIES AND ALLOCATION BOARD — Powers of this agency are exercised by priority control of industry. At its creation on Aug. 28, 1941, SPAB was given authority to fix allocations and priorities of materials, fuel, power and other commodities, to direct the allocation of supplies among civilian industries and apportion the available supply of materials among military, defense-aid and total civilian needs. SPAB exercises its powers through such agencies of OPM and does not pass on specific priority applications unless a question of policy is involved. Secretary of SPAB is Herbert Emmerich. The SPAB office is in the Social Security Bldg., Washington.

OFFICE OF PRODUCTION MANAGEMENT—This organization is the principal agency for stimulating the production of all types of weapons of war. Originally it was organized in three operating divisions — production, purchases and priorities—and included a number of commodity sections but in August, 1941, when SPAB was formed, OPM was reorganized with a list of 30 industrial branches. The 30 branches were allocated among four of the seven OPM administrative divisions, with the work of each branch cutting across all of the OPM operating divisions. Thus the Iron and Steel Branch, while assigned to the Materials Division, handles problems concerning iron and steel whether or not they fall in the fields of purchasing, priorities, production, distribution for civilian supply or conservation.

The four divisions of the OPM are the Division of Production, the Division of Purchases, Division of Civilian Supply and the Division of Materials. (How the 30 industrial branches are distributed among the four divisions is shown in the Defense Agency Organization chart accompanying this article.)

The Priorities Division of the OPM has no branches but has specialists assigned to each industrial branch having priority problems. E. Barrett Mason, for example, is the priority specialist assigned to

(CONCLUDED ON PAGE 198)

National Defense Chart

THE PRESIDENT

War Dept.	Navy Dept.	Draft System	Treasury Dept.	Interior Dept.	Executive Office	Council of National Def.	Economic Def. Board	U. S. Canada Def. Board	Agriculture Dept.	Information Dept.

OFFICE FOR EMERGENCY MANAGEMENT

Defense Aid Reports	Defense Communications	Defense Mediation	Transport Division	Defense Housing	Research Office	Inter-Amer. Coordinator	Office of Civilian Def.	Office of Def. and Health

SUPPLY PRIORITIES AND ALLOCATIONS BOARD

(Social Security Bldg., REpublic 505, Branch 744)

Chairman ..... Henry L. Wallace
Henry L. Stimson ..... War Secretary
Frank Knox ..... Secretary of the Navy
William S. Knudsen ..... OPM Director

Executive Director ... Donald M. Nelson
Sidney Hillman OPM Associate Director
Leon Henderson ..... OPA Director
Harry L. Hopkins

OFFICE OF PRODUCTION MANAGEMENT

OFFICE OF PRICE ADMINISTRATION

(Temp. Bldg., REpublic 5050, Branch 641)

OFFICE OF PRODUCTION MANAGEMENT
(Social Security Bldg., REpublic 7500)

Director General	William S. Knudsen
Associate Dir. Gen.	Sidney Hillman
Executive Secretary	Herbert Emmerich
Administrative Officer	Roy Jackson

OFFICE OF PRICE ADMINISTRATION
(Temp. Bldg., REpublic 5050, Branch 641)

Administrator	Leon Henderson
Dep. Administrator	John E. Hamm
Divisions:	
Consumer	Harriet Elliott
Price	J. K. Galbraith
Legal	C. David Ginsberg
Departments:	
Accounting	Herbert F. Taggart
Defense Finance	Raymond Goldsmith, F. Taylor Ostrander
Defense Economics	Richard V. Gilbert
Office Management	George C. Chesney
Statistics	Martin Tailer
Transportation	G. Lloyd Wilson

MATERIALS DIVISION

Director	W. L. Batt
Executive Assistant	C. E. Rhetts
Deputy Director	A. I. Henderson
Industrial Branches:	
Aluminum, Magnesium	A. H. Bunker
Chemicals	E. R. Weidlein
Iron & Steel Branch	C. Edward Adams
Power	J. A. Krug
Deputy Director	Philip D. Reed
Industrial Branches:	
Cork, Asbestos	F. W. Gardner
Nickel	D. H. Ueblacker
Tungsten	H. K. Masters
Copper, Zinc	J. A. Church
Manganese, Chrome	Andrew Leith
Tin and Lead	Erwin Vogelsang
Mica-graphite	H. C. Sykes
Miscellaneous Minerals	R. J. Lund

PRIORITIES DIVISION

Director	Donald Nelson
Deputy Director	Thomas B. McCabe
Asst. Dir. (Policy)	Blackwell Smith
Technical Consultant	S. S. Stratton
Asst. Dep. Dir. Compliance	L. J. Martin
Asst. Dep. Dir. Priorities	J. L. Overlock
Asst. Dep. Dir. Liaison	E. A. Locke, Jr.

CONTRACT DISTRIBUTION DIVISION

Director	Floyd B. Odlum
Executive Assistant	J. M. Whitaker
Advisory Eng. Committee	George S. Armstrong
Small Businessmen Comm.	Walter W. Finke

PRODUCTION DIVISION

Director	W. H. Harrison
Industrial Branches:	
Aircraft	M. C. Meigs
Engineering	E. M. Powers
Production Planning	A. E. Lombard, Jr.
Manufacturing	H. R. Boyer
Ordnance	E. F. Johnson
Tanks, Combat Vehicles	W. W. Knight, Jr.
Explosives	L. de B. McCrady
Small Arms, Ammunitions	E. S. Chapman
Heavy Ordnance	L. E. Osborne
Tools	G. C. Brainard
Cranes	Sydney Buckley
Foundry Equipment	F. G. Steinebach
Used Tools	C A. Simmons
Heat Treating Equipment	D. B. Stoughton
Shipbuilding	Rear Admiral Land
Construction	W. H. Harrison
Defense Instruments	(Vacancy)

OTHER OPM DIVISIONS

Labor Director	Sidney Hillman
Deputy Director	Isador Lubin
Purchases Director	Douglas MacKeachie
Deputy Director	Arthur Newhall
Employment Practice Director	Mark F. Ethridge

DIVISION OF CIVILIAN SUPPLY

Director	Leon Henderson
Deputy Director	Joseph L Weiner
Industrial Branches:	
Paper and Pulp	
Printing and Publishing	
Lumber, Building Materials	
Plumbing and Heating	
Automotive, Farm Equipment	
Elec. Products, Durable Goods	
Industrial, Office Machinery	
Rubber, Rubber Products	

Steel Defense Committees

(As direct allocation of steel for war and non-war use spreads to more products, the Iron and Steel Defense Industry Advisory Committee and its 18 product, or subcommittees, will grow more important to the defense program. These committees, organized by the Office of Production Management on June 24, 1941, advise the OPM on capacity, demand and distribution of various steel items. Similar committees have been set up for many other industries.)

—The Iron Age.

Iron and Steel Defense Advisory Committee

W. F. Detwiler, chairman, Allegheny Ludlum Steel Corp.
B. F. Fairless, president, U. S. Steel Corp.
Frank R. Frost, president, Superior Steel Corp.
T. M. Girdler, chairman, Republic Steel Corp.
E. G. Grace, president, Bethlehem Steel Co.
C. R. Hook, president, American Rolling Mill Co.
Elton Hoyt, 2nd, Pickands, Mather & Co.
H. E. Lewis, chairman, Jones & Laughlin Steel Corp.
H. Niedringhaus, president, Granite City Steel Co.
E. L. Parker, president, Columbia Steel & Shafting Co.
Frank Purnell, president, Youngstown Sheet & Tube Co.
H. A. Roemer, president, Pittsburgh Steel Co.
E. L. Ryerson, chairman, Inland Steel Co.
W. S. Tower, president, American Iron & Steel Institute
E. T. Weir, chairman, National Steel Corp.
R. W. Wolcott, president, Lukens Steel Co.

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Index to Subcommittees

1. Alloy bars, tool steel and stainless steel.
2. Carbon bars, semi-finished and shell steel.
3. Cast iron pipe.
4. Cold finished bars.
5. Forgings and armor plate.
6. Ore.
7. Pig iron.
8. Plant expansion.
9. Plates and shapes.
10. Rails and accessories.
11. Research and conservation.
12. Scrap.
13. Sheets, strip and tin plate.
14. Statistics, codification, forms.
15. Steel castings.
16. Tubular.
17. Warehouse.
18. Wire products.

SUBCOMMITTEES

1. *Alloy Bars, Tool Steel, Stainless Steel Subcommittee*

Batcheller, Hiland G., Allegheny Ludlum Steel Corp., Brackenridge, Pa.
Galbraith, A. T., Crucible Steel Co. of America, New York, N. Y.
Gibbons, Frank, Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
McKenna, Roy C., Vanadium-Alloy Steel Co., Latrobe, Pa.
Parker, J. H., Carpenter Steel Co., Reading, Pa.
Rinek, J. O., Universal Cyclops Steel Corp., Bridgeville, Pa.
Schlendorf, J. M., Republic Steel Corp., Cleveland, Ohio.
Timken, Henry, Jr., Timken Roller Bearing Co., Canton, Ohio.
Tucker, Rufus, Bethlehem Steel Corp., Bethlehem, Pa.
Tuttle, C. E., Rustless Iron and Steel Corp., Baltimore, Md.
Williams, S. D., Copperweld Steel Co., Warren, Ohio.

2. *Carbon Bars, Semi-Finished and Shell Steel Subcommittee*

Andrews, J. B., Jr., Andrews Steel Co., Newport, Ky.
Longfield, C. H., Youngstown Sheet and Tube Co., Youngstown, Ohio.
O'Brien, M. E., Inland Steel Co., Pittsburgh, Pa.
Orr, N. H., Colorado Fuel & Iron Corp., Denver, Colo.
Rowles, R. T., Jones & Laughlin Steel Co., Pittsburgh, Pa.
Seidenbecker, Otto, Wisconsin Steel Co., Chicago, Ill.
Steuer, L. R., Bethlehem Steel Co., Bethlehem, Pa.
Vosmer, W. F., Republic Steel Corp., Cleveland, Ohio.
Wetstein, E. L., National Steel Corp., Pittsburgh, Pa.
Worthington, L. B., Carnegie-Illinois Steel Corp., Pittsburgh, Pa.

3. *Cast Iron Pipe Subcommittee*

Capron, J. D., Glamorgan Pipe and Foundry Co., Lynchburg, Va.
Clow, Kent S., James B. Clow and Sons, Chicago, Ill.
Hazard, Spencer P., Florence Pipe Foundry and Machine Co., Florence, N. J.
Moore, W. D., American Cast Iron Pipe Co., Birmingham, Ala.
Russell, N. F. S., U. S. Pipe Foundry Co., Burlington, N. J.

4. *Cold Finished Bars Subcommittee*

Fitzsimons, R. E., Fitzsimons Co., Youngstown, Ohio.
Goldcamp, C. F., Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Howell, W. R., Bliss & Laughlin, Inc., Harvey, Ill.
Manville, Tracy, Columbia Steel and Shafting Co., Pittsburgh, Pa.
O'Brien, M. E., Inland Steel Co. Chicago, Ill.
Somers, J. T., Wyckoff Drawn Steel Co., Pittsburgh, Pa.

5. *Forgings and Armor Plate Subcommittee*

Cooney, R. B., Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Finkl, William, A. Finkl and Sons Co., Chicago, Ill.
Heppenstall, R. B., Heppenstall Co., Pittsburgh, Pa.
Lang, Emil, Erie Forge Co., Erie, Pa.
Weaver, H. F., Bethlehem Steel Co., Bethlehem, Pa.
Ziesing, H. H., The Midvale Co., Nicetown, Philadelphia, Pa.

6. *Ore Subcommittee*

Berg, H. A., Woodward Iron Co., Woodward, Ala.
Butler, Patrick, Butler Brothers, St. Paul, Minn.
Greene, E. B., Cleveland-Cliffs Iron Co., Cleveland, Ohio.
Hoyt, Elton, 2nd, Pickands, Mather and Co., Cleveland, Ohio.
Munson, J. G., United States Steel Corp. of Delaware, Pittsburgh, Pa.

7. Pig Iron Subcommittee

Berg, H. A., Woodward Iron Co., Woodward, Ala.
Brooke, Robert E., E. & G. Brooke Iron Co., Birdsboro, Pa.
Ford, Key, Hanna Furnace Corp., Buffalo, N. Y.
Harper, A. M., Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Marshall, R. M., Pittsburgh Coke and Iron Co., Pittsburgh, Pa.
Striebing, George W., Interlake Iron Co., Chicago, Ill.
Whiting, J. T., Alan Wood Steel Co., Conshohocken, Pa.
Wilson, H. M., Shenango Furnace Co., Pittsburgh, Pa.

8. Plant Expansion Subcommittee

Bent, Quincy, Bethlehem Steel Corp., Bethlehem, Pa.
Berg, H. A., Woodward Iron Co., Woodward, Ala.
Christie, R. E., Crucible Steel Co. of America, New York, N. Y.
Gillies, William B., Youngstown Sheet & Tube Co., Youngstown, Ohio.
Lose, J. E., Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Lounsberry, F. B., Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Rose, G. E., Wisconsin Steel Co., Chicago, Ill.
Sykes, W., Inland Steel Co., Chicago, Ill.
White, C. N., Republic Steel Corp., Cleveland, Ohio
Whiting, J. T., Alan Wood Steel Co., Conshohocken, Pa.

9. Plates and Shapes Subcommittee

Daniels, C. M. Bethlehem Steel Co., Bethlehem, Pa.
Eastburn, G. S., Central Iron & Steel Co., Harrisburg, Pa.
Geisking, M. H., Tennessee Coal, Iron and Railroad Co., Birmingham, Ala.
Jevon, V. A., Jones & Laughlin Steel Co., Pittsburgh, Pa.
King, Paul M., Worth Steel Co., Claymont, Del.
Roeth, A. C., Inland Steel Co., Chicago, Ill.
Vosmer, William, Republic Steel Corp., Cleveland, Ohio.
Warren, A. H., Jr., Carnegie-Illinois Steel Corp., Pittsburgh, Pa.

10. Rails and Accessories Subcommittee

Dillworth, J. C., Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Geisking, M. H., Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.
Hammond, W. J., inland Steel Co., Chicago, Ill.
Orr, N. H., Colorado Fuel and Iron Corp., Denver, Colo.
Stoll, H. E., Bethlehem Steel Co., Bethlehem, Pa.

11. Research and Conservation Subcommittee

Browne, Vere, Allegheny Ludlum Corp., Pittsburgh, Pa.
Cowan, D. R. G., Republic Steel Corp., Cleveland, Ohio.
Evans, K. J., Inland Steel Co., Chicago, Ill.
Fuller, K. G., United States Steel Corp. of Delaware, Pittsburgh, Pa.
Weikel, C. H., Bethelehem Steel Co., Bethlehem, Pa.
Weir, H. K., National Steel Corp., Pittsburgh, Pa.

12. Scrap Subcommittee

Block, Leigh B., Inland Steel Corp., Chicago, Ill.
Ebersole, Newman, American Rolling Mill Co., Middletown, Ohio.
Givens, W. A., Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Holton, C. R., Bethlehem Steel Corp., Bethlehem, Pa.
Ilgenfritz, C. A., Republic Steel Corp., Republic Building, Cleveland, Ohio.
McMillan, William, National Malleable & Steel Castings Co., Cleveland, Ohio.
Miller, C. R., Jr., United States Steel Corp. of Delaware, Pittsburgh, Pa.
Murphy, Wilmer, National Steel Corp., Pittsburgh, Pa.
Pape, H. E., The Stanley Works, New Britain, Conn.

13. Sheets, Strip and Tin Plate Subcommittee

Adamson, W. J., Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Galbreath, Thomas M., Sharon Steel Co., Sharon, Pa.
Griffith, K. L., Bethlehem Steel Co., Bethlehem, Pa.
Henry, J. A., National Steel Corp., Pittsburgh, Pa.
Long, Arthur, Youngstown Sheet & Tube Co., Youngstown, Ohio.
Loomis, F. H., Republic Steel Corp., Cleveland, Ohio.
Randolph, N. B., Granite City Steel Co., Granite City, Ill.
Reed, N. C., Wheeling Steel Corp., Wheeling, W. Va.
Todd, R. C., American Rolling Mill Co., Middletown, Ohio.
Totten, George, Carnegie-Illinois Steel Corp., Pittsburgh, Pa.

14. Statistics, Codification and Forms Subcommittee

Boyer, P. F., Republic Steel Corp., Cleveland, Ohio.
Creighton, W. J., Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Hall, J. H., Youngstown Sheet & Tube Co., Youngstown, Ohio.
Hesse, F. M., National Steel Corp., Pittsburgh, Pa.
Howell, M. D., United States Steel Corp., Pittsburgh, Pa.
Kingsbury, C. L., American Rolling Mill Co., Middletown, Ohio.
Shick, F. A., Bethlehem Steel Co., Bethlehem, Pa.

15. Steel Castings Subcommittee

Bakewell, Don, Blaw-Knox Co., Pittsburgh, Pa.
Ernst, F. B., American Steel Foundries, Chicago, Ill.
McCauley, John E., Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.
Whitehead, Charles P., General Steel Castings Corp., Eddystone, Pa.
Worrilow, W. H., Lebanon Steel Foundry, Lebanon, Pa.

16. Tubular Subcommittee

Beeson, J. K., Pittsburgh Steel Co., Pittsburgh, Pa.
Clifford, George E., Spang Chalfant, Inc., Pittsburgh, Pa.
Connolly, William C., Ohio Seamless Tube Co., Shelby, Ohio.
Corey, E. P., Youngstown Sheet & Tube Co., Youngstown, Ohio.
Holmes, J. E., Republic Steel Corp., Cleveland, Ohio.
Lawson, R. R., Summerill Tubing Co., Bridgeport, Pa.
Livingston, Edward A., Babcock & Wilcox Tube Co., Beaver Falls, Pa.
McConnor, W. F., National Tube Co., Pittsburgh, Pa.
O'Brien, F. J., Globe Steel Tubes Co., Milwaukee, Wis.
Wiewel, Walter H., Jones & Laughlin Steel Corp., Pittsburgh, Pa.

17. Warehouse Subcommittee

Allen, R. M., Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Block, Joseph L., Inland Steel Co., Chicago, Ill.
Foy, N. W., Republic Steel Corp., Youngstown, Ohio.
Honeycutt, J. V., Bethlehem Steel Co., Bethlehem, Pa.
Manville, Tracy, Columbia Steel Shafting Co., Pittsburgh, Pa.
Scott, H. B., Wheeling Steel Corp., Wheeling, W. Va.
Severns, E. P., Continental Steel Corp., Kokomo, Ind.
Stayman, R. J., Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Woodlock, J. P., Crucible Steel Co. of America, New York, N. Y.

18. Wire Products Subcommittee

Baldwin, A. R., Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.
Beeson, J. K., Pittsburgh Steel Co., Pittsburgh, Pa.
Distler, John P., Republic Steel Corp., South Chicago, Ill.
Hazen, J. F., Bethlehem Steel Co., Bethlehem, Pa.
May, John, American Steel and Wire Co., Cleveland, Ohio.
Orr, N. H., Colorado Fuel & Iron Co., Denver, Colo.
Rollans, Dean, Wickwire Spencer Co., New York, N. Y.
Schusler, Ford, Keystone Steel & Wire Co., Peoria, Ill.
Stone, C. F., Atlantic Steel Co., Atlanta, Ga.

Battleship Armor -- 200-Ton

The prima donna in the steel plant is armor plate, and all the metallurgical and production skills in the plant are lavished on its production. Shown here are three photos of the working of 16-in. belt armor for the Navy's new battlewagons at the Homestead

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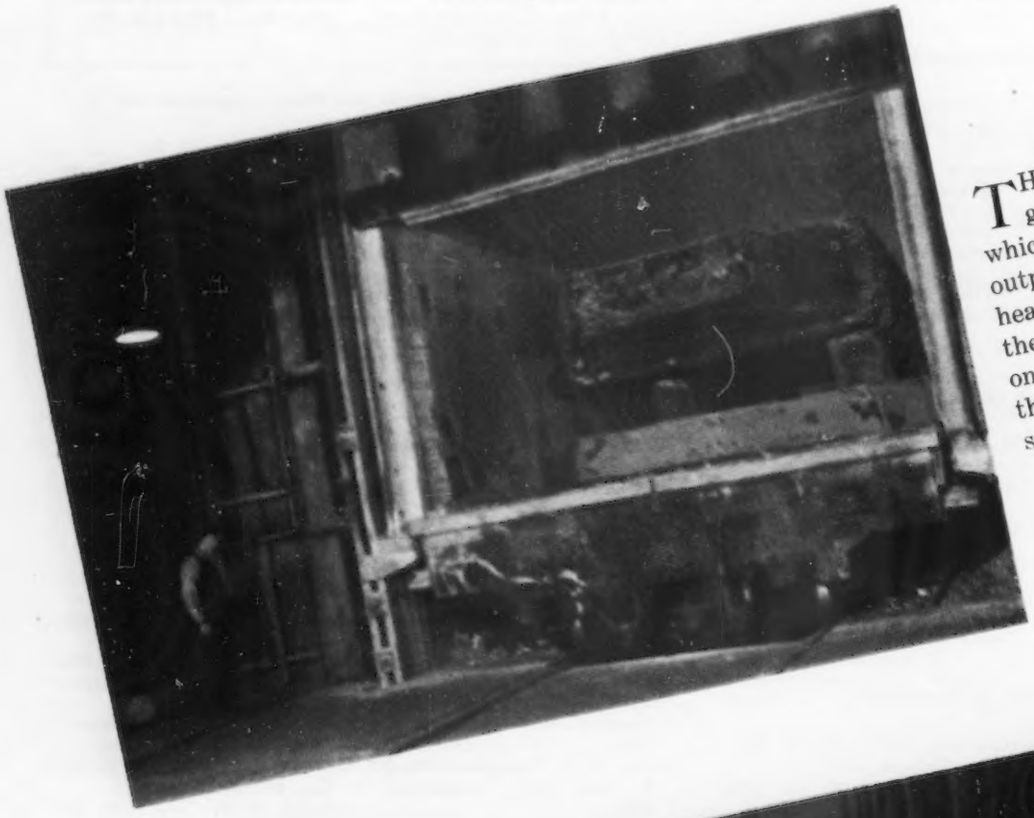
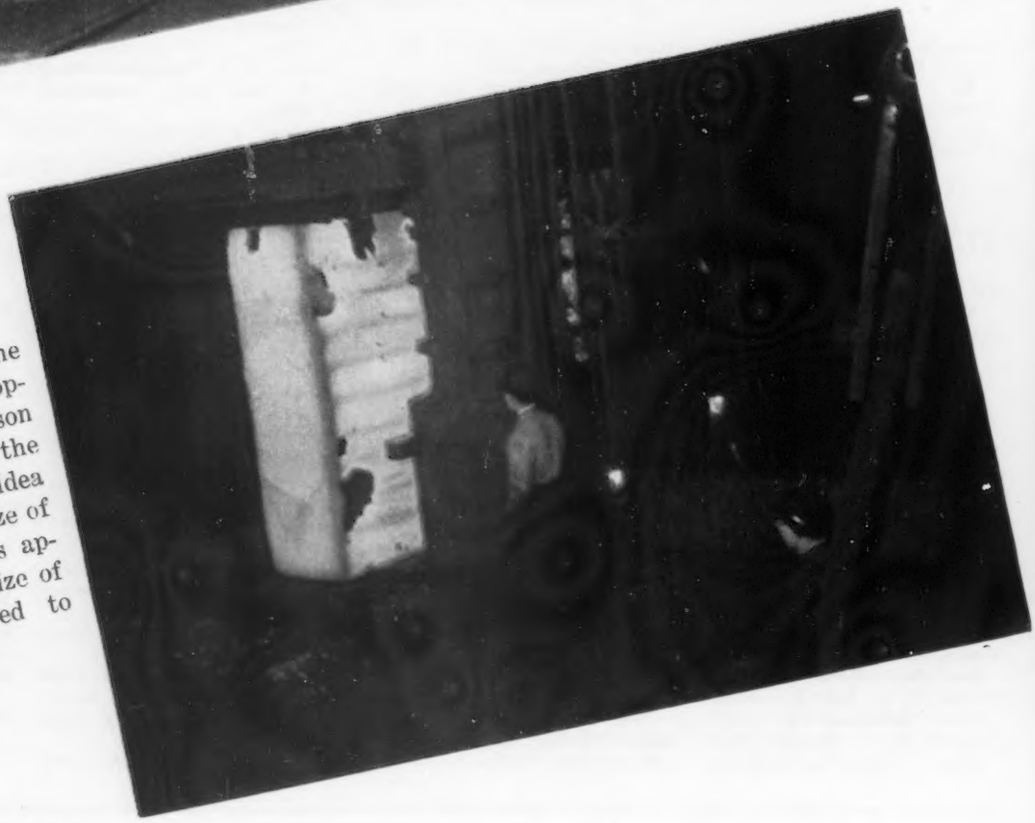


THE armor plate ingot weighs 200 tons, which is the combined output of two open hearths. After stripping, the ingot is blocked up on a car and shoved into the heating furnace to soak slowly to forging temperature.

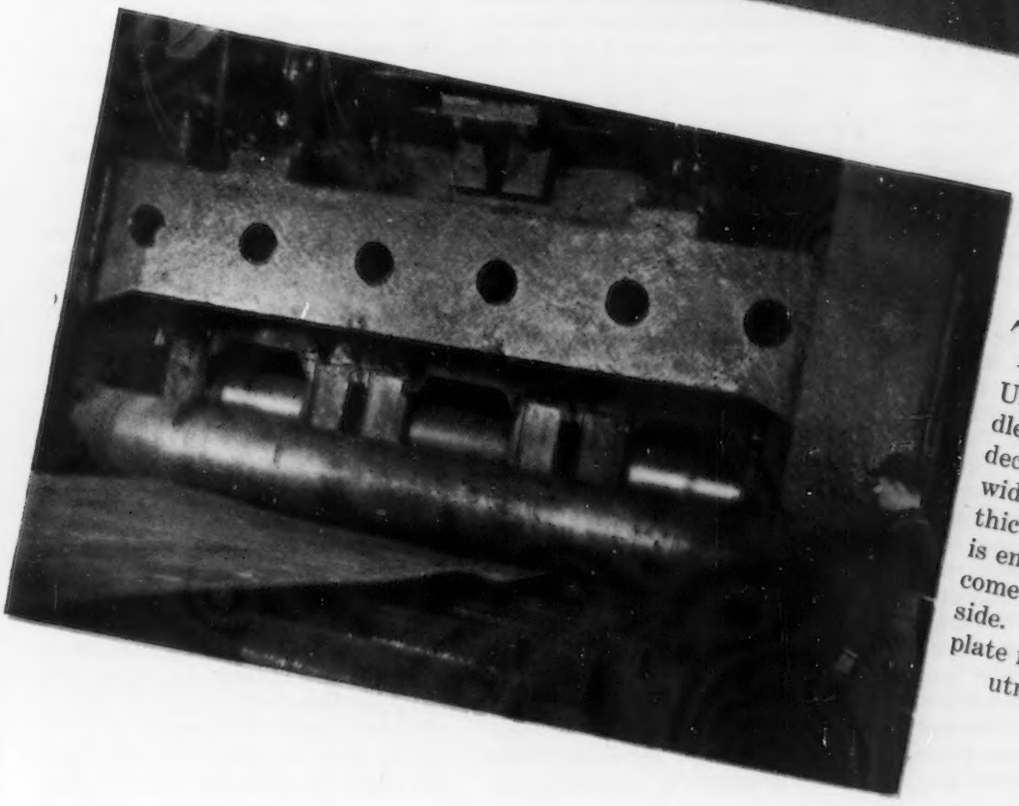


NEAR the end of the rough forging operation. By comparison with the worker in the foreground a good idea is obtained of the size of the slab as well as appreciation of the size of equipment required to handle it.

n Chunks of Jewelry Steel

plant of Carnegie-Illinois Steel Corp. The hydraulic press is a 12,000-ton machine costing $7,000,000 with auxiliary equipment and requiring 15 to 18 months to build. By the end of 1942, five such enormous presses will be in operation in various parts of the country. • • •

AFTER rough forging to the approximate size of the finished plate, the armor plate is conditioned to remove surface defects, reheated and then reforged to exact size. Here is the final forging operation with the press being utilized to its maximum capacity.



THIS is the largest roller leveler in the United States. It handles light armor and deck plate up to 18 ft. in width and 1¾ in. in thickness. Here the plate is entering the leveler to come out flat on the far side. Armor and deck plate must be made with utmost precision.

Labor's F

WHEN bushy-browed John L. Lewis thumbed his nose at Franklin Delano Roosevelt and called out on strike 53,000 workers in the captive mines—the thunder of a nation's wrath beat down upon his head. He was flailed with every name from "paranoiac" to "traitor."

From every side the uproar boiled. Shouts of, "One man's halting the defense program"; "He's set the labor movement back 10 years"; "Somethin' ought to be done about these union leaders"; filled the air.

Through it all, Burly John was calm—not even bloody—much less unbowed. He had said he would call a strike if the Defense Mediation Board didn't decide in favor of the closed shop for the captive mines. He did just what he promised.

That was little over a month ago. The furore was due to concern for the defense program, but the concern was tempered apparently by the thought that labor's attitude alone was the whole crux of our preparedness success. That's why the public demanded that "something be done."

In less than a month all that was changed with the formal declaration of war on Japan.

Everyone's attitude about strikes has done an about face. The public now takes for granted that there will be none now that we are actually fighting. The unions know and accept this attitude, wholeheartedly. Though often accused in the past 12 months of putting union gains above defense, union leaders, generally, have not been guilty of this charge.

The searchlight thrown on the whole labor movement because of defense strikes has shifted. But the effects of the past year's actions and their significance to the whole movement should not be thrown out of focus by the comparative quiet that will reign for the duration.

The immediate labor problem has changed only on the surface. Its basic problems are still there and will have to be solved eventually. When Lewis called his strike, all that he, personally, and American labor as a whole, stood for at that moment could be traced directly to the philosophy of the New Deal. Then, the cry of "chickens coming home to roost" was leveled constantly at Washington. This, too, is now forgotten with something much higher at stake. But New Deal philosophy on labor will only be temporarily shelved for revival when the time is more propitious—just as political party lines will be formed again when the war is over.

Labor Shows Strength in 1941

Since 1933 American labor has gained enormously. Its strength was never more powerfully portrayed than in 1941, when, in the face of repeated warnings, it called key defense strikes and generally got away with it.

Misguided or not, labor acted in 1941 only as any organization of humans would act. It seized the bull by the horns at a time when that seizing was most opportune. On the strength of the past eight years it had every right to believe it would be unimpeded.

Lewis' coal mine strike, if it possessed no other virtue, was logical. The labor leader's stand was the only consistent stand in the situation. It was the government who squirmed to find an out—even to upsetting its own specially created Mediation Board by establishing a new three-man committee which finally gave John his closed shop on Dec. 7, 1941.

For more than eight years, unionization had been getting legally and sympathetically and inferentially all and more than it had ever hoped for. The Wagner Act guaranteed to it the principle of collective bargaining and the administration of the act went far beyond the limits of justice.

Clearly it was broadcast to the public and to the working man that his day had come. The feast was brought in on a golden platter piled high with goodies that even hungry labor wasn't ready to digest.

So skillfully was the public wooed on the "new order" that everyone was all out for social changes, except, apparently, industry which was painted as standing alone. It was only natural for labor to feel, accordingly, and expect that the beautiful honeymoon would last even after the defense program broke. "Business as usual" and "Preserve the social gains" were officially proclaimed. Labor was not advised that any change would be forthcoming or necessary.

Besides, the plum was too close at hand, too near the glorious eat-

Fight for Power

By HERMAN KLEIN
Chicago Editor, The Iron Age

•• Somewhat frightened by a common danger, labor and capital acknowledge a rather uneasy peace. Sharp differences still exist, however, which will if anything be accentuated as the war progresses

ing for labor to stop and think of the consequences. So it plowed ahead in 1941 and came up with a rash of strikes.

Millions of Hours Lost

In March, 8000 were out at Allis-Chalmers for 71 days on a faked strike vote, which lost 3,000,000 production man hours. In April came the strike of 400,000 bituminous coal miners with an irrevocable loss of steel. June was the month when the soldiers were sent to North American Aviation in Inglewood, Cal. August saw the Federal Shipbuilding & Drydock Co. seizure at Kearny. September was the Air Associates embroglio.

Scattered in between and even more important to the tearing down of public patience were the sniping away at the steel plants in Gary, Ind., in Pittsburgh and elsewhere; the Ford battles which offered everything including race riots before the UAW got the closed shop in the Valhalla of all organizers' dreams; the International Harvester Co. close-ups at six plants, where close to 50 professional agitators were indicted at Fort Wayne for violence and even murder; the shipyard and aircraft stoppages on both coasts; the machinists', carpenters' and hoisting engineers' strike in St. Louis, which spread to over 400 of the city's plants and tied up hundreds of millions in defense contracts. Then came John L. and the coal mines!

Public opinion crystalized. Action was forced. The House passed the drastic Smith bill which called for everything labor didn't want. These lines went to press before the final action was taken, but despite early Senate indications of emasculating the Smith bill, the important fact was that the pendulum had started to swing the other way.

To a degree, the acts of 1941 were really beyond labor's control. Objectively, labor and industry were faced in 1941 with five hurdles: (1) The enormous demand for labor for defense production; (2) job shifting from civilian production to defense, which when in full swing, will have created 6,500,000 new jobs by April, 1942; (3) the rising cost of living; (4) a split in labor itself with two major rival organizations fighting for control; (5) the Wagner Act making it the national policy to *encourage* the creation of collective bargaining.

Subjectively, there were the past eight years of building up general consciousness of a new order in which labor was to get an increasing role, and opening wide the door, without impediment, to union gains.

Labor Movement An Infant

The bare facts are that the entire American labor movement is still in its infancy. The much envied British system of industrial relations has fully half a century's edge on us. No human infant can bridge the gap to maturity without suffering the growing pains of adolescence. England's labor has reached maturity. United States' labor is still suckling. Contrary to popular opinion, England has placed no legal responsibilities or sanctions on unions. It depends entirely upon tradition and "gentlemen's agreements" to enforce mediation decisions. Actually, here unions can be haled into court for torts and, under certain conditions, for breach of contract.

American industry and labor have no tradition, no long experience to guide them in dealing with each other. Both have seriously felt this lack of sound guide posts.

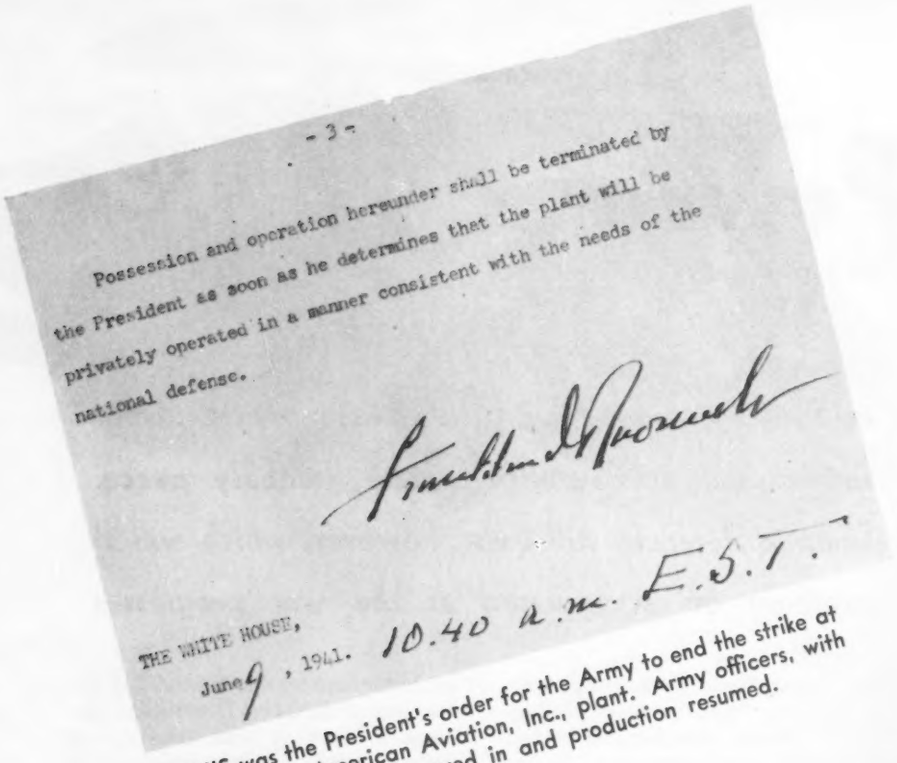
Grievous errors have been made by immature union leaders in the past year. Striking in strategic defense industries; cruel beatings of Americans by goons; destruction of property; violations of contracts are part and parcel of the groping stage which our labor movement is in.

Inexperienced leaders have grabbed too quickly for their ultimate goal. They have now stumbled on a period when the world is forced to think of things other than social advancements; when the democracies must fight to hold what they have. Union mistakes in the past year cannot be put down to a disregard of defense preparations. Leaders and rank and file are as concerned and have their shoulders to the wheel for defense fully as much as any other group.

But, consider their position. The closed shop has always been the dream of labor from the birth of the first union. It is nearer to realization now in our basic industries than ever before. Prosperity and its demand for labor makes it natural for the strike weapon to be effective. This is not the case in periods of depression, when the scarcity of jobs takes away union ammunition, since workers then are interested more in holding a job than they are in union strategy. The successful man in history has always moved when the time was ripe.

WHO Is More to Blame?

Should the unions, therefore, be given the total blame for last year's strikes against defense? Were they responsible for the Wagner Act



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Possession and operation hereunder shall be terminated by the President as soon as he determines that the plant will be privately operated in a manner consistent with the needs of the national defense.

Franklin D. Roosevelt

THE WHITE HOUSE,
June 9, 1941. 10.40 a.m. E.S.T.

THIS was the President's order for the Army to end the strike at the North American Aviation, Inc., plant. Army officers, with 3000 troopers, moved in and production resumed.

absurdities? Did they make the deal which ignored one union and gave to a rival group all the defense construction work "done for or through any federal agency" in return for a promise to refrain from jurisdictional strikes? Did they make the laws which say it is illegal for an employer to fire a man for joining a union but that it is not illegal to discharge a worker for not paying his union dues regularly? Their councils did not devise the ruling that although the government certifies one union as a plant's bargaining agent, it is still legal for the disgruntled union to boycott the employer for dealing with the organization certified.

Certainly the labor lobby had something to do with securing favorable treatment on Capitol Hill. But every group in the country has a lobby there and none has been able to get anything like the bargain handed the workman's representatives. So, with this helpful backing from the top, it was not illogical for union leaders to feel that they were the chosen people, practically owning immunity for any act committed for their cause.

Just as obviously, industry has made its errors, too. It had something by the tail which it didn't quite know how to shake. Actually, the new union strength grew so suddenly that business was frightened by its own feeling of inadequacy. So, in many cases, it threatened, it balked, it lashed out, where the opposite tactics would have been more to its own advantage. It has fought many steps for the simple reason that they came from labor or from labor's friends. Above all, it has resisted more from the fear which grows out of something new and strange than from a dislike of labor itself.

With extremely rare exceptions, industrialists all agree unions are here to stay, and are, in principle, a good thing. The public shares this view. The issue of the closed shop is something else again. Many sound thinkers contend that requiring a man to pay tribute for the privilege of working is an out and out abridgement of basic human rights.

There are union leaders who secretly admit this. There are even some who have privately admitted the future dangers of the closed shop to their whole cause. The dangers that are inherent in every situation where there are no more goals to conquer—specifically, where the dues paying member begins to look askance at his union leader who may grow fat and lazy under the closed shop.

Will Drive Ahead

But the labor movement and its leaders are too young as a class to stop to reflect on these dangers now. They have made it clear that wherever possible—notably steel at first—they will drive ahead for the closed shop in 1942. They have the closed shop in the coal mines, have it to all intents and purposes in the automotive field, and will train their guns now on oil and chemicals in addition to steel. Only the methods will be moderated to suit the times in 1942.

The war will not stop these drives. By no means should this be taken to intimate that work stoppages in armament plants will take place. Even if war had not come, defense strikes would have decreased in 1942 by the union's own volition. But there are other ways of driving ahead that can be pursued in these times.

R. F. LAMMERT, president of Lammert & Mann Co., Chicago, holds a bomb sight for which his company had a large contract. When machinists went on strike, the firm lost the contract for this work

Plans like Phil Murray's and Walter Reuther's, of the UAW, are straws in the wind. Murray is seeking government sanction of his suggestion to establish separate boards on a national and local scale comprised of government-labor-industry. These boards would not only handle labor grievances, but more importantly, they would assist in industrial management planning. Advantages argued are that the

plan would give labor a voice in management and thus help industry level out the hills and valleys of business cycles.

Reuther is the author of the now famous suggestion for utilizing idle automotive capacity for airplane production, which many "experts" have claimed was turned down by industry, solely because it was advanced by labor.

From the union standpoint, one of the choicest gains it will seek this year is industry-wide bargaining. Unions are 100 per cent for it as are many government officials. Industry is divided. There are steel men who say the industry could get a better contract if it would deal as a unit with the unions. There are others who vow that industry-wide agreements are the last stop on the road to a closed shop; and more important, that it would be the last step to making an industry like steel another public utility. Unions want the set-up because it would guarantee an entire industry urging and requiring its workers to be good members. It would eliminate costly separate bargaining procedures. There will be great pressure almost immediately for some forms of industry-wide bargaining in lieu of no strikes during the war.

Labor's biggest problem in 1942 is not only that of getting the closed shop in the basic industries and consolidating membership gains, but of clearing out the strife within. Though they will not show it during the war, the breach between the AFL and CIO is sharp and distinct. It was widened by Phil Murray's outright charge of treachery by the AFL representatives on the Defense Mediation Board in the decision on the captive coal mines. The AFL is also likely to cause trouble in the branch plants of the Ford Motor Co., since those plants had the UAW closed shop forced on them as the result of an election held only by the Detroit workers without the benefit of elections in the branches. Since the NLRB has repeatedly affirmed that the union showing a majority in any plant can be granted exclusive bargaining rights for that plant, the AFL can legally insist on new elections in many of the branches where they, and not the CIO affiliate, claim the majority.

The Four CIO Groups

In the CIO alone, there are four definite groups—the Murray one, composed, strangely, of SWOC and the Amalgamated Clothing Workers representing the conservatives; the radical or Communistic gang, comprising the unions representing the fur, farm equipment and maritime workers; the Lewis group, almost solely the United Mine Workers and "District" 50, representing the workers in the chemical and coal by-products industries; and the United Automotive Workers. UAW stands alone, being, perhaps, the strongest of all single unions, since its Ford victory gives it virtually a closed shop in the automotive industry.

The Communist group has

(CONTINUED ON PAGE 190)

MEMBERS of the Brotherhood of Railroad Trainmen, in September, held a strike election following deadlocked negotiations for increased pay and adjusted operating rules. Union officials here are counting the 150,000 ballots.

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C. I. O. president, Phillip Murray, met representatives of C. I. O. National Unions and State Councils in Washington to plan a campaign against anti-strike legislation pending in Congress.

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Scrap

By W. A. PHAIR

Associate Editor, The Iron Age

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"I THINK some agencies in Washington can do quite a bit, but if anybody in God's world can tell me where the scrap is coming from, or going to, or will flow, without more detailed information than is available at the present, I would like some suggestions."

Thus, A. D. Whiteside, of OPM, on Nov. 11, eloquently summarized the confusion and uncertainty that has hovered over all government efforts to control the price and distribution of iron and steel scrap since late 1940.

What a tumultuous year was 1941 for the scrap industry! Its members, when the year started, were plain "junkies." Before it ended they had been accused of being monopolists and had an antitrust investigation hanging over their heads. They were praised one day for their splendid cooperation in the defense effort and the next day were pushed in the face with dark accusations of putting their pocketbooks before the welfare of the country.

If scrap dealers today wear that twitchy look, the cause is quite obvious. In a short 12 months their industry, which has been aptly described as the most individualistic and competitive branch of the metal working field, has been stuffed, bodily and abruptly, into an economic straitjacket.

Government efforts to control scrap prices were born in suspicion and distrust, nurtured with belligerent press releases and G-men investigations and have grown into a misshapen creature that well displays its bastard origin.

The scrap price schedule was one of the earliest schedules of maximum prices issued by OPA (it was the fourth, issued April 3). Unfortunately, this schedule was developed by a battery of starry-eyed, crusading lawyers whose apparent knowledge of the scrap trade must have been obtained in the environs of the Stork Club.

In public, as well as private conversations, the personal social aims of these Lochinvars appeared to be confused with the true purpose of price fixing . . . to stem off inflation. Noteworthy in their negotiations was the tendency to ignore suggestions made by trade authorities, although currently these recommendations are receiving more sympathetic attention and some have been adopted.

The technique employed in handling some of the more recent price schedules suggests that both OPA and industry are learning from the sad experience of the scrap ceilings, and a more sensible, practical approach is being used.

Time and experience have proved Mr. Henderson, the OPA chief, a reasonable man, amenable to logical arguments, but it will take him a long time to overcome the suspicion and distrust engendered by the attitude of his assistants.

Back in January, 1941, when Joe Jacobson, then president of the Institute of Scrap Iron and Steel, told a meeting of the scrap trade at Baltimore that it would have to lower scrap prices to at least a basis of $20, Pittsburgh (at that time the market was between $24 and $25), the adequacy of scrap supplies was not questioned. This assurance of ample supplies, as a matter of record, was given on several occasions by Washington statements. The problem then was purely one of price stabilization.

However, as the year progressed, and steel ingot capacity was jacked up several times, there slowly developed the realization that the steel industry was facing an actual shortage of scrap. The extent of this shortage cannot be nailed down to a concrete figure, but an authoritative estimate (see THE IRON AGE, Dec. 11, p. 101A) places it at about 10,000,000 tons for 1942. OPM experts, too, are agreed that steel ingot production this year will be dependent not upon open hearth capacity, but upon the amount of scrap that can be moved.

This potential shortage cannot be ascribed solely to OPA's price schedule. It is more basic than

OPA's Problem Child...

• • No longer industry's most individualistic enterprise, scrap collection has become everyone's concern. After far too much rather silly floundering, some obvious steps may soon be taken to solve one of the most important of raw material problems.

that. As long ago as 1933 (THE IRON AGE, Jan. 22, 1933, p. 988) it was pointed out that the displacement of bessemers, which produce more scrap than they use, by the open hearth, which requires more scrap than it produces, would in the late 30's cause a shortage of scrap materials. Table I, which covers operations for the month of August, 1941, clearly illustrates this difference in scrap consumption of the two steel-making methods.

Aside from this basic shortage, there has existed in the minds of many unprejudiced observers a belief that OPA's price schedule has served to slow down the movement of scrap by ignoring the axiom that at times of abnormal steel production, it is the supply of marginal, high cost scrap that keeps mills operating.

To express it another way, the present $20 base is probably adequate for such scrap as is produced within the Pittsburgh area, but it is not sufficient to overcome the freight rate hurdle when scrap is moved from distant points, as it must be at the present rate of ingot output. OPA has belatedly recognized this and has moved gingerly in the right direction by decreeing special terms for "remote" scrap and by setting up special shipping point prices in certain areas, as in New England.

But meanwhile, scrap collecting personnel in those areas has been slowly disintegrating. The attraction of wages paid by war industries and the general uncertainty of the scrap business has seriously depleted the ranks of collectors, and dealers' yards.

Perhaps one of the outstanding weaknesses of the OPA price schedules has been the lack of penalties for violations. No doubt Mr. Henderson hoped that coaxing and cajoling would keep everybody in line. Perhaps it would have been possible, if early in the game he had demonstrated that he intended to enforce the schedules.

Actually, however, OPA has limited itself to periodic wrist slapping, which has been of absolutely no value in attempting to drum up respect for the schedules. To the contrary, some of the agency's actions have directly tended to encourage ignoring the maximums.

The poor mill or foundry buyer is, regardless of how the matter is treated, placed between the devil and the sea. His open hearth superintendent is crying for scrap; Washington is yelling for steel. What can he do? From experience he knows that if he sticks to the schedule, he might as well shut down shop. He'll get no scrap, and as yet it is impossible to turn out steel by melting compliments or letters from Washhington in the open hearth.

There were several bad surges of violations last year, all duly reported in the business papers. Finally, after all supplies available then had been bought up, dealers and brokers and buyers were hailed to Washington for a lecture—but no penalties.

Opinion among scrap dealers and brokers on the schedule was by no means unanimous one way or the other. As one who had the opportunity to observe the trade's reaction first hand during the hectic weeks of January and April, it can

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THUS far community drives have turned up little prime scrap. Bulk of the material collected, as this photograph of typical contributions received in a mid-West drive shows, is very light scrap and often coated. Such scrap is of little help in meeting the shortage.

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be attested that many dealers and brokers, much as they cussed the terms of the order, did conscientiously endeavor to adhere to the letter of the schedules.

Unfortunately, there were others who totally ignored the ceilings and forced the entire market upward. With so many mouths endeavoring to feed at such a small hopper, it was inevitable that as long as OPA refrained from taking positive action (it promised publicity, but not until this past month did it name names), there was no course open to the trade but to follow upward. With open commitments on one side, and mill buyers on the other howling for shipment, no other choice existed. And, in honesty, it must be admitted that it was not too difficult to have contracts adjusted upward by the mills to accommodate the higher prices.

All in all, it appears that if any hanging is to be done, then the rope must also encircle OPA as well as the scrap trade and the mill buyers.

More recently, OPA has proudly announced that it has forced a number of dealers who have exceeded the schedules to refund to the buyers all sums collected in excess of the maximums.

Ignoring for a moment the questions of the propriety of the maximums, and considering only the enforcement, such a lopsided policy as OPA has now apparently adopted can only lead to such universal violations as to render the schedules not worth the paper they are printed on.

As the matter stands now, a buyer may go out and buy above the ceilings, deliberately flouting the schedule (and any scrap buyer today knows what he *should* pay down to the last decimal), get his scrap and then later have OPA force the dealer to refund all sums in excess of the schedule.

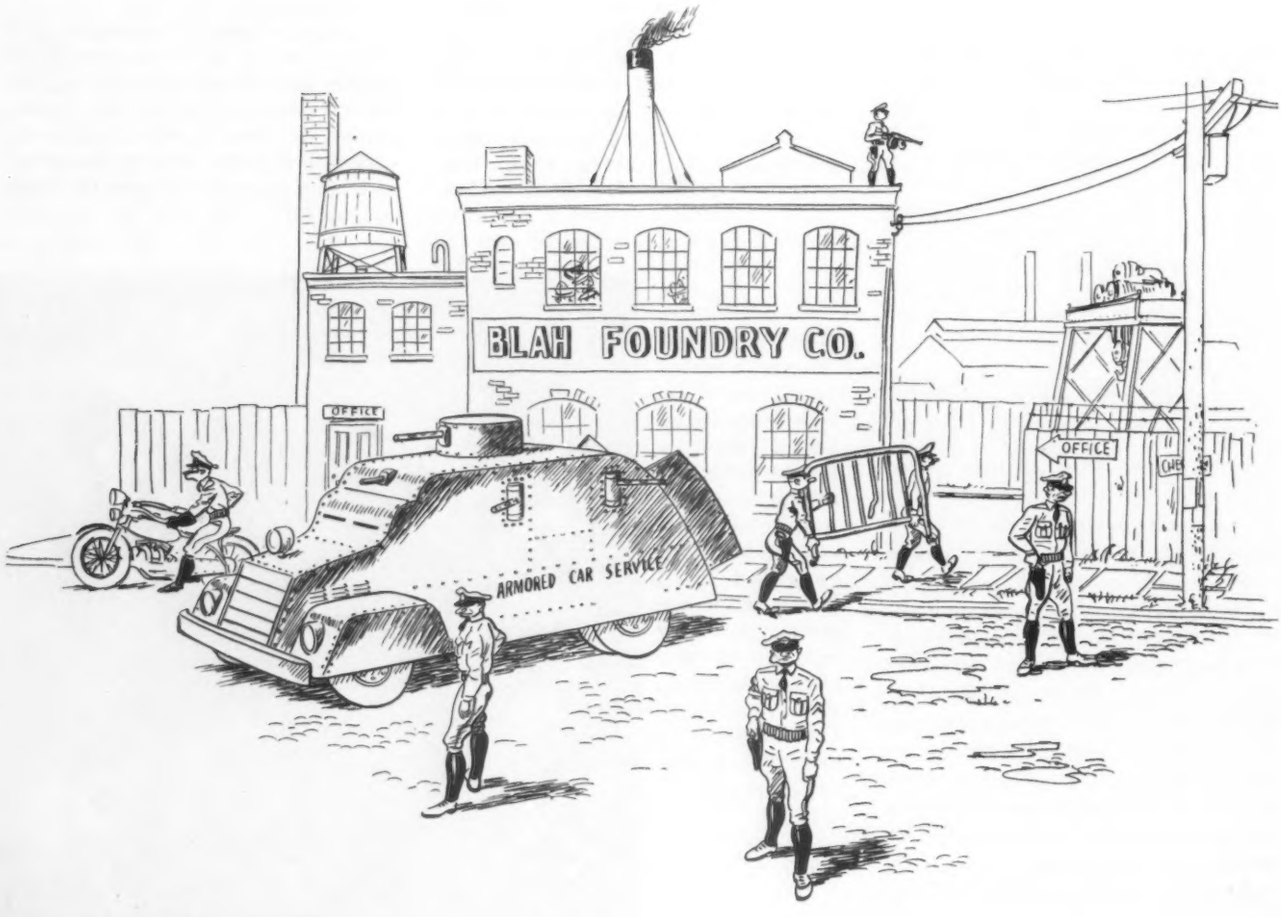
On the other hand a buyer who conscientiously observes the ceilings and refuses to pay above the maximum, can shut up his plant and go home. He isn't going to get scrap. To keep his plant operating, he must ignore the ceiling, get the scrap, and then have the excess rebated. . . . with OPA's approval. In other words, he can eat his cake and have it too.

It is quite obvious that as long as such a policy is adhered to, the schedule can have little significance. So far as its effect on price trends in 1941 is concerned, OPA can be justly credited with stopping an almost inevitable price rise. But at what cost, in the matter of slowing up the flow of scrap, no one will ever be able to say.

While the schedule did halt the rise, it is probably also true that when scrap consumers average their scrap costs for 1941, they'll find that they paid an average of several dollars above the so-called maximum. With buyers of cast grades it will be perhaps four dollars above the ceiling.

The future of prices is most uncertain. But a year from now the schedule will probably be far from what it was last April. The con-

. . . Mr. Blah Gets His Weekly Scrap Allocation



stant reaching out into new territories, the community drives in prospect, will force sharp changes in present pricing methods. Resort to a universal f.o.b. point of shipment price appears inevitable, at a corresponding increase in delivered prices.

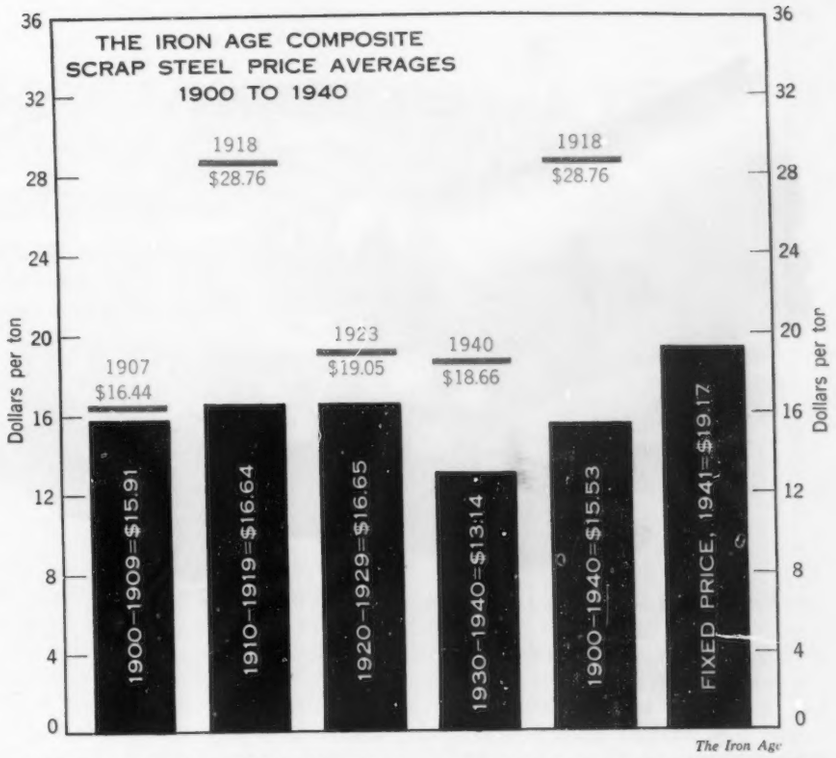
The OPM allocation order has had little influence thus far. As R. C. Allen, of OPM, expressed it, you can't allocate something you haven't got. Thus far OPM has been devoting its time trying to put square pegs in round holes. It has been juggling supplies about, diverting them to this plant, only to find a shortage cropping up in another direction. They have done a commendable job thus far, but it isn't humanly possible to keep this up forever.

Just where supplies will come from no one knows. The OPM is attacking this shortage largely from the viewpoint of making it up in pig iron supplies. This drive for more blast furnace capacity will eventually help balance the picture, but not until well into 1943.

But until sometime after 1943, when new iron capacity is fully available, the prospect is that 1942 ingot production will fall short of actual productive capacity (according to some of the more optimistic guesses) by some 4,000,000 tons, and in 1943 by some 7,000,000 tons. These figures are based on the optimistic estimate that some 23,000,000 tons of purchased scrap will be available each year. More conservative estimates place the available supplies at around 21,000,000 tons.

The scrap industry, OPM's conservation bureau, steel mills and foundries are now engaged in a gigantic, desperate struggle to pull scrap out of the air. Scrap use now is currently running at close to 5,000,000 tons monthly. The ingenuity displayed in this effort is sometimes startling, ranging from the lifting (without permission) of manhole covers in one city to street corner collections of used razor blades in another city.

Perhaps the outstanding obstacle to be overcome before a true picture of the scrap situation can be drawn, is the establishment of authentic statistics of consumption, stocks, production and flow. The Institute of Scrap Iron and Steel has made a most commendable start in this direction, but the prodding of the trade by the government under Order M-24, and price Schedule No. 4 was badly needed to drive home the urgency of the need for such data. The second monthly filing of Forms PD-149, 150 and 151 has been completed and tabulation is under way. When this is finished, it should be possible to obtain, for the first time, a clear picture of the supply situation.



• • Except for the 1930-1940 period, scrap prices have, on a 10-year basis, shown little variance since 1900. Figures in red show the high for each period.

The story is told in the East of a scrap dealer who parked his car in front of his office in the morning and found it in the baling press that evening.

House to house canvassing and a scouring of rural areas will not begin to ease the deficit. Aside from the small quantity involved, the quality is such (see illustration on p. 77) as to make a large part unusable in an open hearth.

Scrap Used by Various Steel Making Methods—August, 1941

	% Scrap to Charge	% Pig Iron to Charge	Production Ratio Electric Output=1
Open hearth..	48.1	51.9	23.8
Bessemer	5.9	94.1	1.9
Electric	98.3	2.0	1.0

It is not far fetched to look forward to the day when this country will be importing scrap from Libya and Manila.

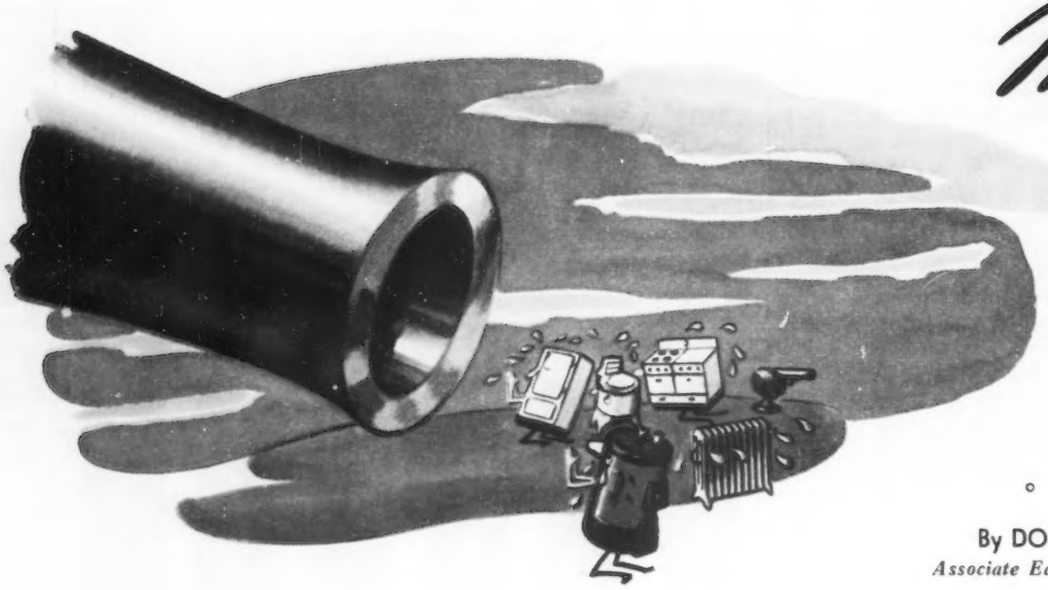
While scrap is now the No. 1 problem child of the war program, the scrap business itself is undergoing a startling change. In recent years the increasing use of light steels has brought No. 2 heavy melting steel into greater prominence. Now, with all industry attuned to war work, borings and turnings are going to be the important source. One Washington authority has predicted that when the war effort gets into full stride there will be created tonnages of borings and turnings such as no one has yet conceived. The war is truly a battle of milling machines and drill presses.

The handling of the chips, borings and turnings coming from the milling machines and drill presses is going to present some serious problems. Chips and borings, as such, are not economical materials for open hearth or blast furnace use. But, briquetted, they are an ideal raw material and can be easily transported.

The existing briquetting capacity

(CONCLUDED ON PAGE 216)

Metal W



By DON R. JAMES

Associate Editor, The Iron Age

THE bombs Japan suddenly raining on Pearl Harbor Dec. 7 not only put the United States at war in a big way, but shot full of holes plans which had been mapped carefully for the 1942 industrial economy.

High volume armament output at unprecedented speed is the goal now to insure victory. During 1942 metalworking plants can expect tighter control over metals; stricter inventory regulations; requisitioning of stock piles, equipment and perhaps even labor, while at the same time terrific pressure will be exerted for more war production. Two major trends which logically can be expected to result from the above forces are stimulation of manufacturing pools and unprecedented production relationships within industries. At the same time rising to a new high degree will be the ingenuity and determination of small plant owners, preventing much of the havoc in their ranks which many calamity howlers now visualize.

From the start of the defense program in 1940 until late last year, a fairly orderly pattern marked the broad changes underway in metalworking industries as a whole. The charts and tables with this article show principal aspects of this greatest expansion in history. But all told the total amount of disruption in 1941 was less than predicted at the start of the year. In combined output of both armament items and normal metal goods, the year was one of the most productive metalworking industries have had. Highlights on the armament side include:

Airplanes—Monthly output rose from 1016 in January to about 2200 in October and continued increasing to the year end as 26 plants speeded up. The peak is still far away, but may be reached in 1942. Plane Engines—Monthly output went from 2,305,610 hp. in January to 4,343,600 hp. in September.

Naval Construction—From January to December, 27 major combat vessels were commissioned, including an aircraft carrier, two battleships and 14 destroyers; 41 naval vessels were launched including three battleships, six cruisers and 19 destroyers; and keels were laid for two more battleships, three plane carriers, 18 cruisers, 80 destroyers and 25 submarines.

Tanks—Output soared late in the year from an estimated 450 light and medium tanks in September to around 650 in October and about the same number in November. By Jan. 1, it was planned to have output going at 840 a month, or 30 per cent of a rate of 2800 a month projected before the end of 1942. Contracts well past $300,000,000 have been awarded.

Other Combat Vehicles—Output in the fall of 1941 up 217 per cent over January, 1941.

Machine Guns, Garand Rifles, ammunition, mortars, etc.—Production gained rapidly during the year but were still not up to their peaks.

There have been and will be many tribulations and disappointments in the armament effort, just like there were in the first World War. But there will be good news. American tanks and certain types of planes already have commanded respect. The new anti-aircraft gun, most powerful weapon of its type ever engineered, promises to make history.

About $43 billion in defense contracts had been placed by the end of the year 1941, and deliveries shown by disbursements were about 26 per cent of the contracts placed. This is only a bare start. The program's progress stepped up in the latter months of 1941, although still slow compared to available funds, which were increased by $10 billion in late 1941 to a total of around $77 billion. Contracts placed in 1942 will total at least $30 billion.

In 1941 war production was roughly one-quarter of total civilian output. In 1942 it is estimated war production will be over half of total industrial production for the year. In 1942 the United States will be producing about 15 times the volume of armament turned out in 1940.

By November, 1941, after nearly 1½ years of the defense program, the Army and Navy Munitions

Working Groups FACE SURVIVAL TEST

Stricter Controls Coming During 1942 but Ingenuity and Determination of Small Plant Owners Will Prevent Much of the Havoc Expected

o o o

Board inventory of industrial plants totaled only 12,271 plants out of an estimated 185,000 manufacturing concerns in the nation. (From January to November, 1941, 2669 plants had been added to the list while 770 were canceled.) At the same time it was estimated by War Department officials that about 6000 plants of the 12,271 surveyed and listed were not yet manufacturing defense items.

In addition to the impressive gains in armament production, United States plants during 1941 managed to score surprisingly large output of such products as mechanical refrigerators, ranges, stokers, automobiles and other items, as shown in an accompanying tabulation. It was not always easy to maintain operations, as shortages of copper parts and lack of other strategic materials frequently caused trouble. The high volume reached a peak in second quarter of 1941. Toward the close of the year the government started clamping down, as shown in the table, and in December the quotas which had been set up for 1942 were undergoing sharp downward revisions.

Besides the industries shown in the tabulation, bicycle makers had a year of high production, although threatened seriously at year end by rubber and brass shortages; manufacturers of toys and sporting goods piled up high inventories in second quarter; juke boxes, office furniture, decorative jewelry and scores of other items were having their problems at year end. Even umbrella makers were cutting the number of steel ribs in their product. It began to appear that refrigerators with wooden sides might come out in 1942, with other drastically changed products.

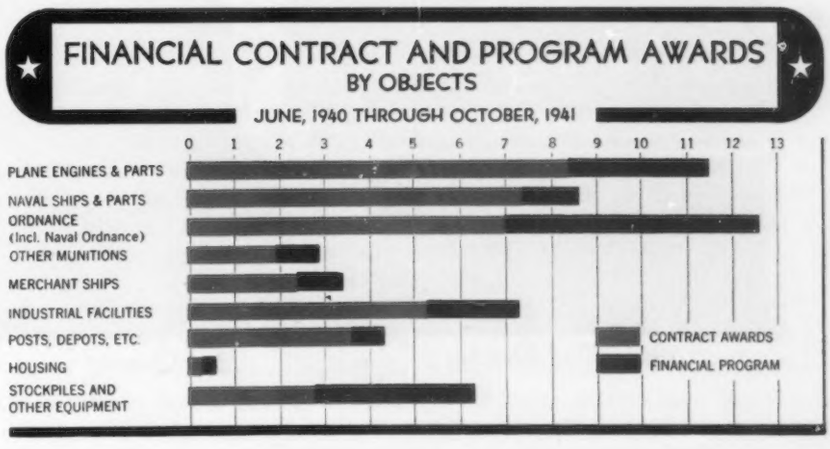
The new turn of events unquestionably will require severe modifications in the nation's industrial pattern, but not as many plants will be stilled completely as some persons now expect. Proof started to appear in late 1941 that conversions can be made in plants which at first seem hopeless. Several investigating groups late in the year came to the conclusion that the amount of equipment adaptable to war production had been underestimated.

In 1942 new sections of the metalworking industry, large and small plants, will be transformed into useful fields through two factors often underrated—the ingenuity and determination of American industrialists themselves. The majority have not yet been forced to the point of desperation, and hence do not know the limit of their capabilities. Before the end of 1942, however, many will have learned the truth of the old adage, "You never know what you can do until you try," and will be using materials they never dreamed of using, and making machine tools perform tasks far from their intended use.

As many have learned already, waiting for someone to come along and offer defense works is futile. Assuming the only avenue of escape is through government help is also the wrong approach. To a large extent the individual must help himself in the "survival of the fittest."

The aggressive and imaginative manufacturer will find plenty of opportunities before late 1942. In addition several factors will operate in his favor. War requirements on such a huge scale will require new thinking by those guiding the production effort. Many specifications necessarily will be written down to tap the output of small shops. Instead of designing and then setting out to find subcontractors, it may dawn on authorities to determine design on the basis of parts that can be produced readily in subcontract shops.

The war emergency is likely to force the government to foster pooling of shops more vigorously than during 1941. Anti-trust obstacles; Walsh-Healey impediments and provisions against fees for the procurement of contracts will be hurdled by having defense associations start at the request of OPM, and

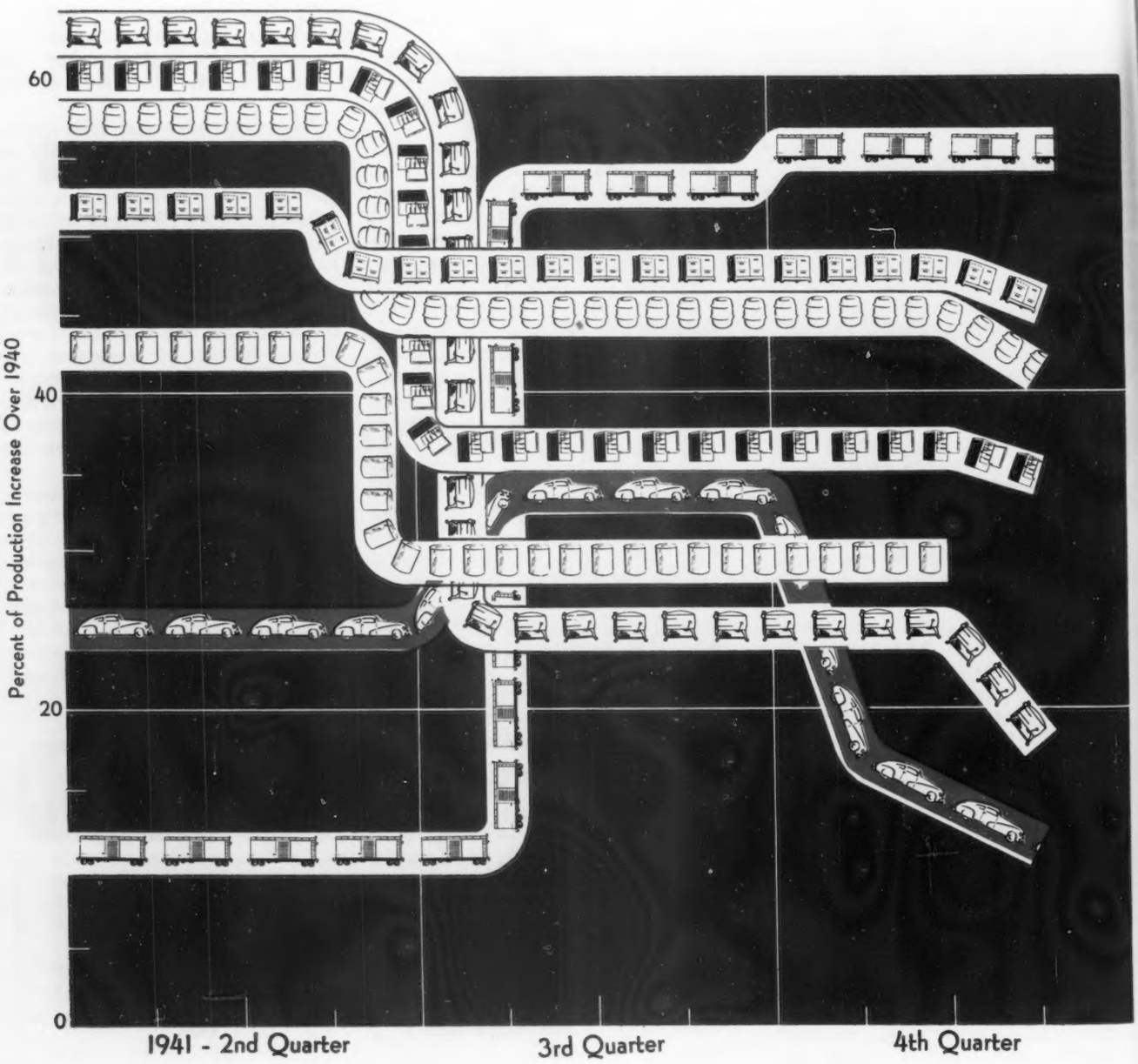


then submit plans to the Department of Justice, with a proviso that no legal action is to be taken unless sanctioned by OPM and the Justice Department. Sponsors will be limited to manufacturing units within an industry or a community sponsored and organized by the participants or by public or civic groups working without profit; plants which can do all of any one job and who plan to spread the contract among co-venturers. Organizations which are formed upon a membership solicitation basis will be barred from clearance.

Sponsors of the proposed pools will first compile data on type of operations proposed; machine tools available; labor available, and full financial data. Then an investigation will be conducted by the government.

The trend toward cooperation within industries came to the fore in 1941 through the growth of government-fostered industry committees and the government's necessity for full information in order to map materials requirements. Interchange of production grew markedly in some industries. The growth of the latter will be much more pronounced if the war continues over a long period. Individual manufacturers may be as-

• • • How material shortages, curtailment orders and other pressures from the war program slowed down the rate of increase in production over 1940 is shown in this chart.



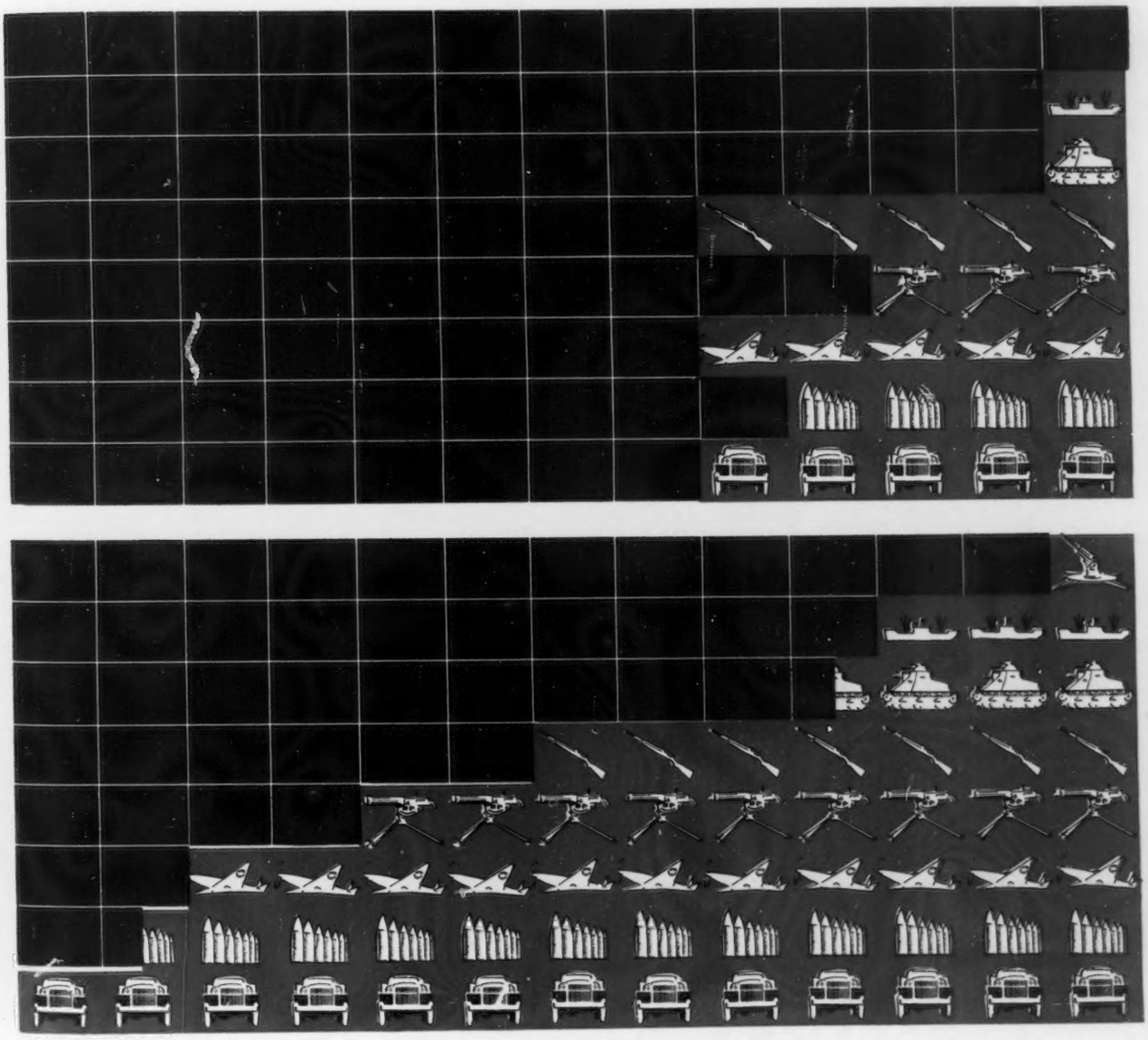
signed certain specific production tasks in their fields, and quotas may be interchanged to expedite and simplify matters for all concerned in the field.

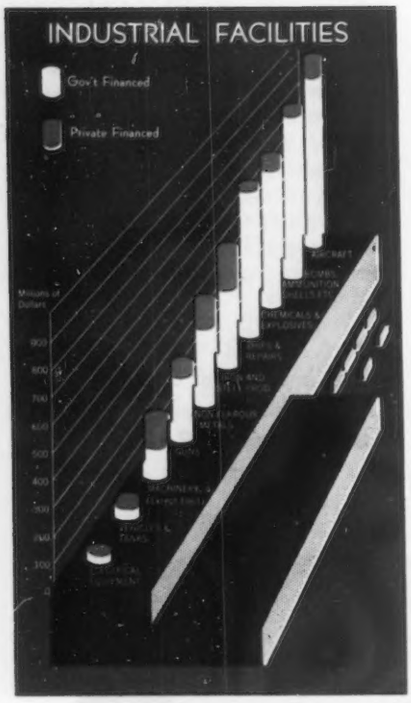
In addition to the greatly expanded war program which will force the use of more metalworking shops than at present, some conversions may be made from non-essential civilian goods to essential goods, especially where use of critical materials is not involved. Essential goods will include repair parts, for which demand will rise as equipment grows old; and articles to serve a purpose temporarily when regular equipment cannot be obtained.

Some government officials will continue to fight for principles of work-spreading. An industry using a comparatively small amount of scarce material and employing a substantial number of people, will be in line for help, as will an industry which has a large number of skilled workers that can be switched to defense work with a comparatively small amount of training. In other industries, physical size of plants will be a determining factor in conversion as the tempo of war production increases. Large factory areas that can be used in the fabrication of defense equipment may have to shift to defense production.

One serious problem still to be ironed out, and immediate action

• • • Gains shown in a period of 1941 in output of a few war products are shown in the chart on this page. Output of most items is still below the expected peak. Rough approximations form the basis for this chart. Top of chart is early 1941; bottom is late 1941.





is needed if the United States armament program requires the help of small shops to the extent it seems to require, is financing assistance. Forty per cent of subcontractors have a "submarginal" credit rating, says OPM. Attempts are being made to achieve easier loan arrangements.

For checklist of steps taken in seeking subcontracts, see layout on pages 86 and 87 immediately following this article.

On an industry-wide basis, the outstanding conversion movement of the year 1941 was in the washing machine and ironer field, with 34 plants. The government provided much assistance and viewed the attempted transformation as an experiment for guidance in adapting to war production such industries as the vacuum cleaner field, furniture, stoves and refrigerators. Advisory groups representing these industries were scheduled to be in conference with Washington officials in the early part of 1942, maping their plans for conversion. Each industry will be asked to pool its best engineering brains and make them available to the smallest plants in the industry; to divide available work and perhaps share materials.

In late 1941 OPM had certified eleven industrial areas for special consideration in the award of defense contracts, and reported 39 other areas facing severe priorities unemployment. Areas certified were: Wisconsin—Manitowoc, Kenosha-Racine, Ripon; Indiana—Evansville; Pennsylvania—Meadville; Iowa—Newton-Kellogg; Ohio—Mansfield; Michigan—Greenville, Grand Rapids, Muskegon; Georgia—Eatonton.

Six plants at Evansville, Ind., were awarded contracts totaling $1,334,694; one Greenville, Mich., plant was awarded a contract worth $539,818; four plants at Mansfield, Ohio, were awarded contracts worth $6,500,000 and Army subcontracts there were estimated at $380,000; at Manitowoc, Wisc., four companies received $596,400 in contracts; in the Kenosha-Racine area 16 companies received awards totaling about $4,800,000. Seven plants at Grand Rapids, Mich., received contracts totaling $311,000.

In the washer-ironer industry Apex Electric of Cleveland, Easy Washer of Syracuse and 1900 Corp. of St. Joseph, Mich., received contracts totaling $12,966,360, with the understanding subcontracting would be done among other firms of the industry. Contracts of $819,260 were awarded to firms in the industry at Alliance, Ohio, and Erie, Pa.

Areas of greatest war production at the end of 1941 were pretty much the same as at the end of 1940. Three of the regions showing gains in contracts received were the West South Central area, the East North Central states and the East South Central region.

Metal Consuming Industries in 1941 and 1942

(In units unless otherwise specified)

	1941 (Est. Production)	1940 Production	OPM Action
Passenger autos, U. S. only—Calendar Year	3,300,000	3,692,328	Curtailed 26½% August through November; 48% in December from Dec., 1940. Sharp cuts in 1942. (Footnote A)
Barrels, heavy steel	17,388,000	13,536,000	
Cans	20,000,000,000	16,000,000,000	
Farm implements	$711,000,000	$561,000,000	Limited during last 5 mos. to 20% above similar months in 1939 or 1940. (Footnote F)
Freight cars (Railroad shops and contract shops)	76,550	65,545	
Gas heating appliances (excl. conversions)	69,100	51,287	
Juke boxes	48,000	49,000	Production cut 50% starting Jan. 1, 1942.
Oil burners	293,000	264,232	
Ranges, gas and electric	2,800,000	2,146,739	Cover lids eliminated by Dec. 15. Cut of 32-40% in use of iron and steel ordered in first quarter of 1942. (Footnote B)
Refrigerators, mechanical	4,084,000	2,718,692	Limited during last 5 mos. of 1941 to 43.2% under sales of 12 mos. prior to June 30. Sharp cuts in 1942. (Footnote C)
Stokers, mechanical, residential type	187,900	149,003	
Trucks	1,070,000	777,026	
Typewriters	$100,000,000	$35,000,000	
Vacuum cleaners	1,600,000	1,384,827	Limited during last 3 mos. of 1941 to 90% of average monthly sales for 12 mos. ended June 30.
Washing machines, gas engine & electric	1,900,000	1,452,666	Limited during last 5 mos. of 1941 to 17% below average monthly factory sales for 12 mos. ended June 30. (Footnote D)
Water heaters, storage type, gas & electric	819,900	594,350	

A—For 2,000,000 units in 1942, industry would use 2,500,000 tons of steel; 610,000 tons of iron; 39,000 tons of copper; 20,500 tons of zinc; 30,000 tons of lead; 1100 tons of secondary aluminum. Consumption of all metals changed from previous years due to redesigning. Primary aluminum and nickel virtually eliminated.

B—Cover lid elimination saves 2500 tons of steel annually. Amounts of iron and steel per unit in 1940 estimated at: gas range, 233 lbs.; electric, 212 lbs.; coal and wood 364 lbs.; kerosene, gas or fuel oil, 69 lbs.; combination, 487 lbs. Initial curtailment of 32-40 per cent in first quarter of 1942 estimated by OPM to save 58,000 tons of steel.

C—Amount of steel per unit generally estimated at 190 lbs.

D—Amount of steel per unit generally estimated at 57 lbs.

F—Under a 20 per cent cut in 1942 industry would use: steel, 1,040,000 tons; cast iron, 640,000 tons; secondary aluminum, 1100 tons; copper, 9600 tons.

• • • Flame cutting the M-3. Sprockets for tank tracks are accurately cut out of heavy steel plate with a multiple head, pantograph oxy-acetylene torch unit. The templet is in the foreground. Picture taken at American Locomotive Co. by Ritchie.

Outline of Steps in Seeking War

THERE is no one best way of discovering opportunities to obtain war production subcontracts. Success in getting work often results only after much chasing around, a lot of bell ringing and wearing out shoe leather and tires. A salesman's tip, a news item, a visit to an OPM contract clinic, an advertisement or some other clue may set off the chain of events leading to success, and then again the plant operator may wind up with a bunch of loose ends. Individual determination and salesmanship are certainly necessary in the hunt. Even after obtaining the initial job, which may be entirely different from the work originally sought, the search for more work goes on constantly.

Not only are there opportunities in connection with the production of guns, shells and tanks (which most everyone thinks of first when war production is mentioned) but thousands of common items like cake tins, water dippers, stove parts, pocket knives, etc., are required by the armed services.

Never before have there been so many government and civilian agencies anxious to help industrialists get into the war production picture. Below are listed a few hints in the chase for subcontracts.

Sources of Information

(Note—the following list of information sources on contract awards, general purchasing policies, invitations to bid, etc., was compiled Dec. 15, at which time the government was contemplating withdrawing, on account of the necessity for secrecy, some of the information it has been issuing.)

"Defense Contract Award Listing," issued by Office of Government Reports in each state. After Jan. 1, 1942, it is planned that monthly lists will be issued showing awards in each state. There will be a charge for the lists. Apply to proper state office. If address of state office is unknown, its address can be obtained from Office of Govt. Reports, 1405 G Street N. W., Washington, or from nearest OPM contract distribution office.

Branch Offices of OPM Defense Contract Service — periodic mimeographed lists of opportunities. Not all branches do this, but some do. There are now 92 district offices. They are listed on page 87.

Public Relations Branch, War Department, Washington. Daily Bulletins.

"Victory," weekly magazine of OEM. Lists contracts awarded and certificates of necessity filed. Price 75c per year. Superintendent of Documents, U. S. Printing Office, Washington.

Lists of awards and bidding invitations are maintained at OPM Contract distribution offices.

Weekly in THE IRON AGE—Several pages devoted to "sales possibilities," which are geographically classified; news of new plants, etc. (Government awards were printed until banned in late December).

Numerous private services issue daily lists to their subscribers.

General Bulletins

Army—"Army Purchase Information Bulletin." Obtain from War Department, Washington. Free.

Navy—"Selling to the Navy." Obtain from Navy, Washington. Free.

Other Needs: "How to Sell to the Government for Civilian Needs," U. S. Department of Commerce. Free.

(Note—OPM's 92 branch offices for aiding contract distribution frequently have extra copies of the above three booklets for distribution. All offices have file copies.)

"Federal Standard Stock Catalog," section IV, part 1, Federal Specifications Index. Obtain from Supt. of Documents, Washington, for 15 cents.

"Price List 75," 6th Edition, Federal Specifications, also obtainable from Supt. of Documents.

Both Army and Navy publish separate indexes of some specifications which may be obtained from Supt. of Documents, Washington, for 25 cents. Quartermaster General, Marine Corps, Washington, publishes list of Marine Corps specifications.

Aircraft — Joint specifications of Army and Navy are covered by "Material and Process Specifications," Bulletin No. 23. Obtain from Chief of Material Section, Wright Field, Dayton, Ohio.

Helpful Offices

ARMY ORDNANCE—14 district offices. (Listed in THE IRON AGE, Oct. 30, 1941, pages 88-91.)

AIR CORPS—4 district offices. (Listed in THE IRON AGE, Oct. 30, 1941, pages 88-91.)

ARSENALS, PROVING GROUNDS, etc. (Listed in THE IRON AGE, Oct. 30, 1941, pages 88-91.)

NAVY — Buying is centralized through Bureau of Supplies & Accounts, Washington; Navy Bureau of Ordnance, Judge Advocate General, etc. (See THE IRON AGE, Dec. 11, 1941, pages 114-118. Also includes list of private shipyards.)

MARITIME COMMISSION — Procurement Section, Division of Construction, U. S. Maritime Commission, Washington.

BRITISH PURCHASES — Buying is done by Procurement Division of U. S. Treasury, assisted by district ordnance offices. British Purchasing Commission only places small contracts.

OPM DIVISION OF CONTRACT DISTRIBUTION—has 92 district offices. Listed on next page.

(After determining plant's fitness to produce, some of the above agencies mail bulletins to prime contractors telling them about prospective subcontractors.)

POOLS OF SMALL PLANT OPERATORS — Opportunities frequently can be found by keeping in touch with pools of small plant operators.

Getting on Bid Lists

Companies should apply for inclusion on mailing lists by addressing a separate letter to each purchasing agency they are in a position to supply. Give ample information to establish qualifications. Enclose catalog or folder describing product or facilities.

To get on the Navy's bidder list apply directly to the Bureau of Supplies & Accounts, Navy Department, Washington. This is the centralized Navy purchasing agency. It buys or supervises purchases for all accounts except the Bureau of Yards & Docks, Bureau of Ordnance; Judge Advocate General of the Navy and the Marine Corps.

Arsenals, district ordnance offices and prime contractors should be informed of the company's facilities also.

Analyzing Facilities

Authorities urge thinking in terms of war production; visualizing new products, new materials and new methods. Helpful to the executive wishing to make the transformation, and invaluable to everyone he contacts, will be a prospectus or outline of facilities, mentioned below. Send or personally deliver prospectus to purchasing agencies; prime contractors; OPM contract distribution offices and other agencies. Representatives of the company carry the prospectus with them in calling on firms that might be logical customers and many also carry a kit of sample parts.

Preparing Prospectus

Persons contacted in the search for subcontracts desire a complete picture of the facilities being offered them. Prepare a typewritten outline covering the topics suggested below. Make the outline simple but complete. Write the facts just as though you would tell them to a friend interested in your plant.

Purpose, Location and History of the plant seeking work. (Description of products; names of customers; transportation and power facilities, etc.)

Management (including past experience of production executives).

Capitalization.

Labor Supply. (Number of employees, hours of work, average rates, etc.)

Machinery and Equipment. (Full list of machine tools. Give measurements, sizes, speeds, tolerances, and other details as fully as possible.)

Description of land and buildings. (Areas outside and inside; plant protection.)

Illustrative material; pictures of plant outside and inside; blueprint of plant layout; blueprint of plant site.

Bids

Some subcontractors assert their experience has shown that even if the first job is only a break-even proposition it is better to get in with a prime contractor, gain his confidence and become familiar with the work, than never to get it.

In general, prospective subcontractors are hesitant to place bids on work they have never done before. If the work can be negotiated, they seem to feel surer of making out all right. In some cases, however, bids cannot be averted, and in such instances the subcontractor's best procedure is to consult with as many persons as possible on the subject of costs. Often prime contractors will show their costs on the part and allow coverage to the subcontractor in view of his inexperience. OPM engineers may be of some assistance. If the subcontractor will inspect the part dependably, more money will generally be allowed by the prime. Primes who really have the vision of what they want will allow the subcontractor to make sample parts on a time basis to determine costs. These samples will show whether he is suited to serve the prime or whether changes are needed to reduce costs. At the same time, the prime contractor will not have much to lose. Not having the overhead of larger firms, many small companies are able to compete successfully even though their time for making the part may be greater.

Production; Lists of Helpful Agencies

Financing

The financial load is often very severe upon small subcontracting plants. The changeover is costly. The financing problem of the prime contractor frequently is much simpler as in effect both the government and the subcontractors will be financing the work for him over short periods.

Subcontractors often can borrow from banks if contracts can be shown. Assignment of the contract may be demanded. In some cases, loans can be obtained from prime contractors after the subcontractor passes the experimental stage with the prime. If your facilities are valuable to him, the prime is interested in keeping you going.

The RFC has helped some subs who actually are engaged in the business and have bankable assets. It is desirable to consult the financial division of the OPM Contract Distribution Division before approaching the RFC.

Having obtained a reputation, keep in contact with the same agencies you negotiated with to obtain the first contract.

OPM Contract Offices

Ala.: Birmingham, 301 Phoenix Bldg.
Ariz.: Phoenix, 406 Security Bldg.
Arkansas: Little Rock, 304 Rector Bldg.
Cal.: Los Angeles, 1031 S. Broadway.
San Francisco, Furniture Mart.
Oakland, Fin. Center Bldg.
Colo.: Denver, U. S. Natl. Bank Bldg.
Conn.: Hartford, Phoenix Bank Bldg.
Bridgeport, Professional Bldg.
Del.: Wilmington, 314 Penn Bldg.
Fla.: Jacksonville, Hildebrandt Bldg.
Miami, 514 Congress St.
Tampa, 901 Wallace S. Bldg.
Ga.: Atlanta, Suite 150, Hurt Bldg.
Idaho: Boise, Capital Securities Bldg.
Ill.: Chicago, Fed. Reserve Bank Bldg.
Springfield, 407 Leland Office Bldg.
Ind.: Indianapolis, Circle Tower Bldg.
Evansville, Koenig Bldg.
Iowa: Des Moines, 505 Crocker Bldg.
Kans.: Wichita, Union Natl. Bank Bldg.
Ky.: Louisville, 200 Todd Bldg.
La.: New Orleans, Canal Bldg.
Shreveport, 916 Giddens Lane Bldg.
Maine: Portland, 443 Congress St.
Md.: Baltimore, Fed. Reserve Bank Bldg.
Mass.: Boston, Fed. Reserve Bank Bldg.
Fall River, 27 South Main St.
Lowell, Sun Bldg.
Springfield, 95 State St.
Worcester, State Mutual Bldg.
Mich.: Detroit, Fed. Reserve Bank Bldg.
Minn.: Minneapolis, Midland Bldg.
Miss.: Jackson, 610 Tower Bldg.
Mo.: St. Louis, Fed. Reserve Bank Bldg.
Kansas City, Fed. Reserve Bank Bldg.
Mont.: Helena, Fed. Reserve Bank Bldg.
Neb.: Omaha, 501 Grain Exchange Bldg.
Nev.: Reno, Saviers Bldg.
N. H.: Manchester, Amoskeag Bldg.
N. J.: Newark, 176 Sussex Ave.
N. M.: Albuquerque, 103½ West Central Ave.
N. Y.: New York, Chanin Bldg.
Albany, State Bank Bldg.
Brooklyn, 16 Court St.
Buffalo, Mfrs. & Traders Bank Bldg.
Rochester, 119 East Main St.
Syracuse, Starrett-Syracuse Bldg.
N. C.: Charlotte, New Liberty Life Bldg.
N. D.: Bismarck, First Natl. Bank Bldg.
Ohio: Cleveland, Union Commerce Bldg.
Cincinnati, Union Trust Bldg.
Columbus, 305 Spahr Bldg.
Dayton, Third Natl. Bank Bldg.
Toledo, 519 Spitzer Bldg.
Youngstown, Union Natl. Bank Bldg.
Okla.: Oklahoma City, 540 Key Bldg.
Ore.: Portland, 815 Bedell Bldg.
Pa.: Philadelphia, Fed. Reserve Bank Bldg.
Allentown, 506 Hamilton St.
Chester, 12-14 East 5th St.
Erie, Erie Trust Co. Bldg.
Harrisburg, Black Stone Bldg.
Johnstown, U. S. Natl. Bank Bldg.
Lancaster, 655 Woolworth Bldg.
Norristown, Norristown-Penn Trust Bldg.
Pittsburgh, Fed. Reserve Bank Bldg.
Reading, 615 Penn St.
Scranton, First Natl. Bank Bldg.
Wilkes-Barre, Miners Natl. Bank Bldg.
Williamsport, Susquehanna Trust Bldg.
York, Mfrs. Association Bldg.
R. I.: Providence, 530 Indus. Trust Bldg.
S. C.: Columbia, 204-206 Manson Bldg.
S. D.: Sioux Falls, Royce-Greeley Bldg.
Tenn.: Memphis, 2112 Sterick Bldg.
Chattanooga, 909-910 James Bldg.
Knoxville, 202-204 Goode Bldg.
Nashville, 1014 Stahlman Bldg.
Texas: Dallas, Fidelity Bldg.
El Paso, El Paso Natl. Bldg.
Houston, Fed. Reserve Bank Bldg.
San Antonio, So. Texas Bank Bldg.
Utah: Salt Lake City, Utah Oil Bldg.
Vt.: Montpelier, 12 State St.
Va.: Richmond, Johnson Publ. Bldg.
Wash.: Seattle, Nat. Bank of Commerce.
Spokane, Old Natl. Bank Bldg.
W. Va.: Wheeling, Hawley Bldg.
Wis.: Milwaukee, 1st Wisc. Natl. Bank Bldg.
Eau Claire, 128½ Graham Ave.
Wyo.: Casper, P & R Bldg.

Materials, Production

Most prime contractors supply the material, so that subcontracting costs are confined to tooling, labor and overhead. Some primes will buy the material and deliver it, while others extend their priorities, enabling the subcontractor to buy from the same sources as the primes.

Close checking of prime contractor's standards is advisable. Have gages checked to prime contractor's standards. Have samples checked before starting production run.

Keep time cards and other records on all jobs, for examination by prime contractor if necessary.

Keep prime contractor informed how job is going. Take delivery schedule seriously. Failure to do so holds up the plans of the prime contractor who is under compulsion to make delivery, and arouses suspicion in his mind.

Assuring More Work

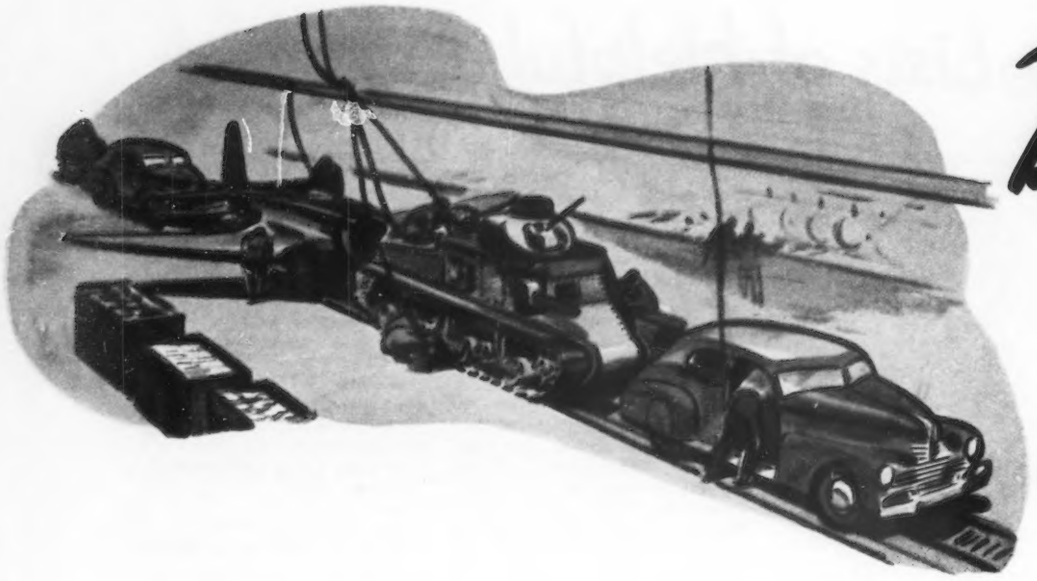
To maintain a continuance of subcontracting work and obtain varieties for all machines, keep in contact with government offices, prime contractors, pools and individuals originally approached.

Items Navy Will Buy

Here is a list of items used in Naval construction which are of particular interest to metal-working plants. The items marked by an asterisk (*) are those most likely to be obtained by the Navy under the newest appropriation bill which has just been passed.

Items of Particular Interest to Metal-Working Plants

Blowers, Forced Draft
Boilers
*Cable, Electric
*Cable, for Mine Sweepers
*Cast Steel and Iron
*Cast, Non-ferrous
Cipher Machines
*Compressors, Air
*Compressors, Air, Medium
*Compressors, Air, H.P.
*Compressors, Refrigerating
Condensers
*Diesel Alternators (Complete)
*Diesel Engines, for Aux. Vessels
Diesel Engines, for Submarines
Ejectors
*Electrical Fixtures and Apparatus
*Engines, Gas
Engines, for Landing Boats
Engines, for Ships Boats
Equipment, Barber
" Cobbler
" Galley and Scullery
" Hospital
" Laundry
" Office
" Soda Fountain
" Tailor
Evaporator Sets
*Fastenings, Bolts, Rivets, Screws, Etc.
*Fastenings, Welding Rods
Feed Heaters
*Flasks, Pressure
*Forged Steel
*Furniture, Living and Berthing
Furniture, Office
*Gages
*Gears, Main, Sets
Generators, Diesel, for Subs.
*Hardware
Machine Tools (Ship)
Machine Tools (Store)
*Machinery, Ammunition Hoists
*Machinery, Anchor Engine
Machinery, Crane
*Machinery, Misc.
*Machinery, Steering Engine
*Machinery, Winches
*Machinery, Vent Sets
*Miscellaneous Material
Motors and Gear Sets, for Subs.
*Motor Generators
*Oil Coolers and Purifiers
*Packing and Insulation
*Paravanes
Periscopes, for Submarines
*Piping, Ferrous
*Piping, Ferrous, Valves
*Piping, Non-Ferrous
*Piping, Non-Ferrous, Valves
*Plumbing Fixtures
Portable Tools, Power
*Propellers
*Pumps, Lub. Oil
Pumps, Main Circulating
Pumps, Main & Aux. Condensate & Booster
*Pumps, Misc. (Small)
Pumps, Aux. Circulating
*Pumps, Fuel Oil
Pumps, Main Feed
Pumps, Reciprocating
*Radio and Sound, Transmitters
*Radio and Sound, Receivers
Ramps, Boat
*Refrigerating Machinery
*Rigs, Boat
*Rolled, Aluminum
*Rolled, Brass and Bronze
*Rolled, Steel
*Rope, Wire
*Searchlights
*Shafting, Main, Sections
*Special Treated Steel, Forged
*Special Treated Steel, Rolled
Storage Batteries, for Submarines
*Storage Batteries, Portable
Switchboards, Control for Submarines
Switchboards, Fire Control
*Switchboards, Interior Communication
*Switchboards, Main
Throttle Valve Assemblies
Transformers
Turbines, Main, Sets
Turbo-Alternators



Detroit IN

THE last days of 1941 found the automobile industry shifting gears to complete the greatest transition ever accomplished by any manufacturing industry. It is a sweeping change-over from peacetime production to the business of making almost every kind of accoutrement for war.

A complete shutdown of all the civilian assembly lines has been in effect virtually since the middle of December and will continue briefly until the exact nature and extent of the nation's expanded, all-out war program is decided.

This change-over of the world's greatest single producer of civilian goods to become the world's greatest potential producer of military goods has been underway throughout 1941, having got started 18 months ago when the initial defense program was launched. Now the defense program has turned into a war program. Although the extent of the industry's transition is as yet not measurable, and the eventual volume of war production well-nigh incomprehensible, the stupendous facts of the transition itself require a scurrying back to a definition of words and ideas, seeking clarification so there will be a better understanding of both the means and the goal.

The automotive industry and its management and personnel, on which the mechanized war of this generation depends, have undertaken to produce items from virtually the entire list of modern weapons. This, of course, corresponds with the industry's extensive coverage of peacetime products. It is elementary to say that the word *automotive* means simply self-moving or self-propelled, but some years ago even the great Society of Automotive Engineers got into a discussion of that problem and the answer is that automotive engineers have in their diversified ken such items as airplanes, airplane engines, diesel powerplants for trucks, locomotives, boats, submarines and aerial torpedoes (driven by internal combustion engines).

Geographically, the scope of the automotive industry is just as great. The equipment with which it works is housed in plants from coast to coast, although it is concentrated, fortunately, for the most part in the inland area radiating from Detroit.

As to its mass production, that development of the automotive industry is symbolized in the conveyor, but the term means much more than that. Conveyors are impotent when idle, and they are idle when not well-manned, well-managed and well-fed with materials. For that reason, the manpower, the brain power and the systematic planning and scheduling of the automotive industry are the mainstays of a major portion of the war program.

The time has come when the industry's tooling is valuable, its scheduling and follow-up methods imperative, and there is comfort in the words of a famous production engineer who says that he and his hundreds of industrial suppliers will get the defense job done for the nation "even if we have to crack their heads together, to get it done —on time!" This characteristic damn-the-torpedoes attitude is really the explanation of the automotive industry's unfailing co-ordination and it is well worth while to carry the attitude over into war production.

The war materiél which the industry is being called upon to produce is principally mechanized equipment, although Detroit and environs will also make guns and shells and other traditional weapons of war. For the mechanized army, the basic performance measurement is horsepower. No matter what shape the products may take, but especially if they are planes and tanks and trucks, the automotive industry knows their antecedents. They are "our babies," as one of the leading engineers puts it, so the changeover that the industry must make is, in a sense, mostly one of changing labels on the products, with the fundamentals remaining the same. In this way of looking at it, there is ample assurance that the automotive industry will deliver the goods, and will deliver them as quickly as possible.

With this transition going on, the automobile plants will deliver fewer automobiles and will make more planes and tanks and trucks.

The reduction in automobile output in the latter half of 1941 was a significant part of the industry's participation in the defense program. It was accomplished by government regulation, with operations

IN TRANSITION . . .

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By W. F. SHERMAN
Detroit Editor, The Iron Age

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The assembly line is being geared up to win the war. One armored division requires 400,000 hp. (one-sixth output of Grand Coulee Dam), and the men with the know-how in horsepower are squaring away to build the world's best war machines.

after Aug. 1 on a monthly quota basis that held output for the period at approximately 75 per cent of the output in the corresponding period of 1940. This systematic regulation continued until Dec. 15, at which time the war emergency resulted in more severe restrictions, so that most plants shut down their assembly lines.

Today there is probably no one in the world who knows even what the next 30 days hold for automobile producers. It would be foolhardy to guess, because even January's emergency quota may not hold good next Monday morning when plants are supposed to resume assembly of about 100,000 cars for the month.

There is no gage at present that is applicable to permit an estimate of 1942 production of automobiles. A spokesman for OPM has said that if American output were scaled down during the war as British output has been, we would build only 50,000 automobiles per year. But that gage simply will not apply to United States auto production, even though it probably will be talked about a great deal in the months to come. The basis for this blunt assertion is that the economic structure in the United States exists on the foundation of a highly developed system of individual transportation by automobile. Statistics are available in abundance to support this contention; they have been published and will be widely quoted because they are pertinent, but they are not important here. Suffice it to say, that there is general agreement that the proper limitations to automobile production will be only those which result from the fortunes of war or because of unavailability of materials and labor to build cars. It should be the goal to build a reasonable number of cars in 1942, consistent with the national situation.

There is a likelihood that some kind of certificate of necessity or priority order will be applied to the purchase of new cars before the end of 1942 if the situation remains grave or grows worse. This would

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SIMULATED blitz attack at General Motors proving grounds. What is learned by engineers in building trucks and tanks for off-the-road operation will be reflected some day in better peacetime vehicles.

follow naturally, after really severe curtailment, because of the great amount of "necessity use" to which automobiles are subjected in the United States.

The total number of vehicles produced during 1942 may eventually be quite substantial anyhow because of increased demands for busses, trucks and military units. These factors cannot be measured right now but recent performance of the industry in Canada is an indicator. In the Dominion, production of vehicles in 1941 was approximately 260,000 units, a figure which equals the Dominion's peak production in the 1929 model year. Of the total, more than 80 per cent of the vehicles produced in Canada were listed as trucks.

Availability of three basic materials will probably be the major determining factor in setting up 1942 production of automobiles. Rubber, copper and steel are the trio.

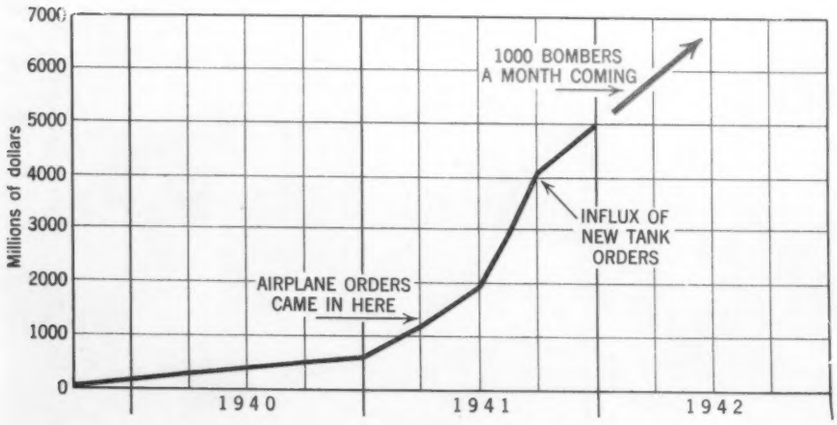
Of the three, copper seems to be the most easily disposed of. Its essential uses in the automobile are in the ignition system and in radiators. Assuming that wiring will be available because tonnage requirements are so slight, the copper problem revolves about the technical probability of substituting some other material for brass in radiators. It is a tough problem, but the finding of substitute materials is not an impossibility. There are career men in the automobile industry whose main task has been the finding of substitutes. Heat transfer properties of steel are not satisfactory for radiators, and there may be those who say that the finding of a substitute in this instance is impossible, but doing the impossible is what technicians in this industry thrive on.

The two real keys to the automotive situation are rubber and steel. What quantities of these materials will be available for automotive use has not been estimated yet, nor can estimates be made until more is known about the trend that will be charted in the box score of war.

THE $47,000,000 bomber plant the Ford Ypsilanti, Mich. The "L" shaped plant, produce giant Consolidated

The United States began bargaining in June, 1940, with British and Dutch interests for huge quantities of rubber to be stock-piled in this country. Now it is bargaining in earnest with the Japanese fleet and air force. Rubber has become the actual, rather than the theoretical key to continued automobile production. Upon the amount of rubber available for tires for new automobiles will hinge the auto industry's demand for steel in 1942. Whether the demanded quantities of steel will be available is at present considered a secondary factor.

It is possible only to size up the rubber situation, not to reach any decisions about it yet. A favorable balance for the United States has been set up in the 18 months since the government began stock piling. In July, 1940, net imports amounted to 68,974 long tons (some very small quantities, about 500 tons a month, are re-exported, so net imports are the significant figures). Consump-



CUMULATIVE war contracts now at $5 billion. Quarterly cumulations are shown after the December, 1940 period. Source: Automobile Mfgrs. Association.

Motor Co. is building at Willow Run, near scheduled for completion this year, will B-24 bombers.

tion of rubber, even in 1940, was less than imports, amounting to 47,011 tons for July. Since that time, imports have been increased as much as possible and consumption has been watched carefully, although defense demands have boosted the total.

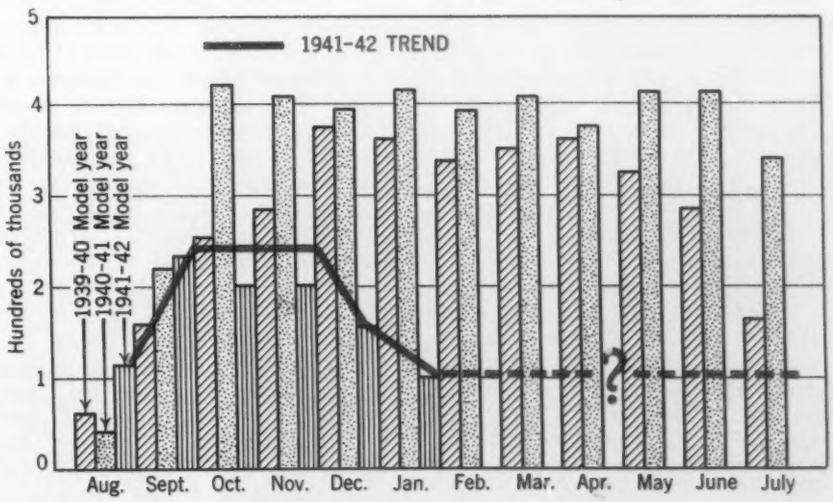
On the credit side of the ledger now is an increase in the stocks of crude rubber from 190,222 long tons on hand at the end of July, 1940, to 454,711 long tons at the end of October, 1941. Of these supplies, 265,739 long tons were in the hands of the government in October. Afloat were 172,633 long tons. Our reserves amounted to more than 625,000 long tons.

How far will these supplies go? That's the primary question. In 1939, a fairly typical year, rubber consumption amounted to 592,000 long tons. In 1940 consumption was boosted to 618,349 long tons. In other words, we appear to have on hand a year's supply by normal standards. Judicious use of the crude, extensive reclamation of old rubber, and other conservation measures might extend that supply to two years, it is estimated. Sharp restrictions in the manufacture of automobile tires appear to be one of the first steps that will be taken. Tires and inner tubes constitute a major use of crude rubber, amounting each year to about 280,000 tons for passenger car tires and another 40,000 tons for inner tubes. Careful conservation of rubber inventory and successful efforts at threading the troubled waters of the Pacific with fresh cargoes is indicated as the answer.

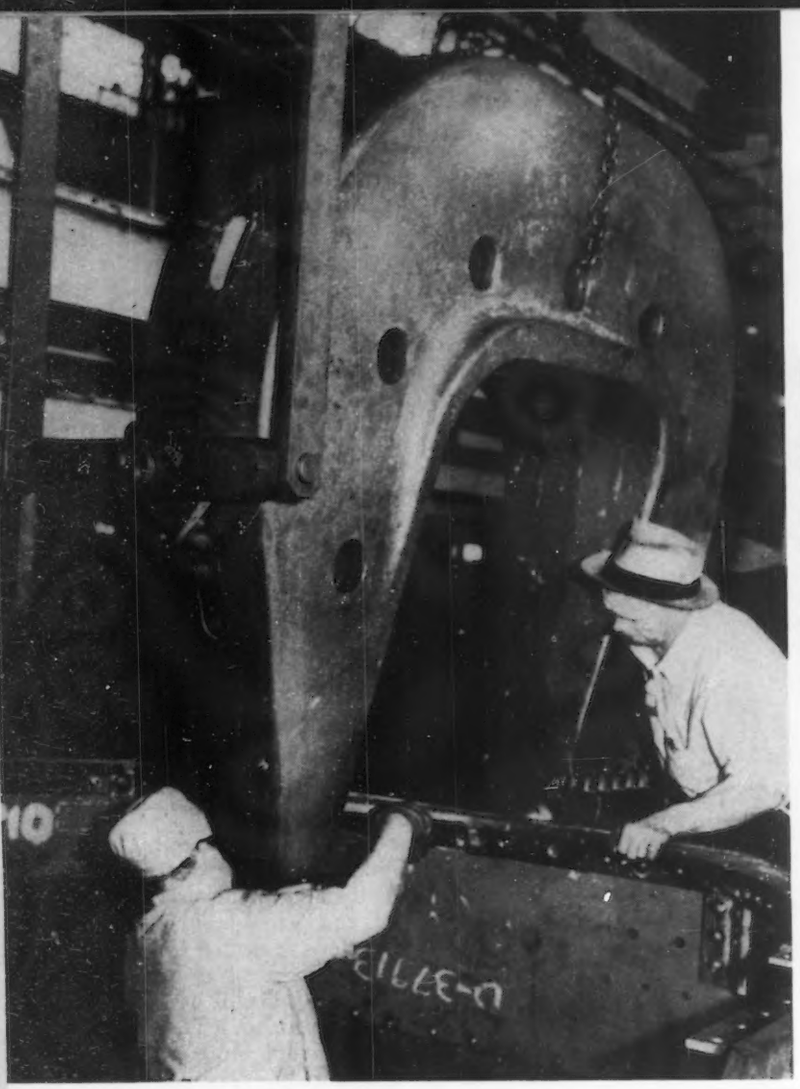
Synthetic rubber factories are not much of an answer for the automobile industry. It has been agreed by experts that no matter how much synthetic material is produced in new plants, it will all go directly into war production because the synthetics have special uses not satisfied by natural rubber.

For many months to come the labor question will be one of excesses rather than shortages. It had been anticipated that 75 per cent curtailment of auto production would come in the spring months, bringing with it unemployment for 250,000 men. But that was anticipating some absorption during the first quarter of the year. Now the unemployment is with us, without a chance for immediate absorption. In this month unemployment may actually exceed the scary figures which previously were projected for next spring. Defense projects to absorb these unemployed will be a year, at least, in maturing. That will hold true even though more orders are let immediately. The immediate adoption of seven-day-a-week plant operations on a 24-hour-a-day basis offers a possibility of easing the employment situation, as well as substantially speeding war production.

Approximately $5,000,000,000 in war orders had been placed with



Here is how automobile output shapes up under the quota system.



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GIANT riveters are used in the Chrysler Tank Arsenal to cold-rivet 28-ton M-3 medium tanks. Riveters such as these weigh more than 4 tons each and have a squeezing pressure of more than 100,000 lb. per sq. in.

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automobile makers up to the end of 1941. Auto makers are in production, ready to start production, or at present tooling up on these orders. Their output is to be delivered at various completion dates ranging up to 24 and perhaps 30 months hence. Only as an approximation, it has been said by one of the industry's executives that a $3,000,000,000-a-year output of arms is feasible in 1942 on these orders. That rate of output approximates the value of output of automobiles and trucks in one of the industry's "good years," but it must be remembered that most of the military equipment is more costly on a per-pound or per-unit basis than is the automobile. In any event, an output of $3,000,000,000 a year from the automobile industry does not represent a full 12 months of all-out production. Because the industry has always been seasonal, nothing equivalent to all-out production has ever been attained. The industry's "capacity" in terms of all-out production might be three or four times the best figure it has attained in normal times. That potential is far from being used by orders on the books today.

Figures on the subject are scarce, but the closest approximation is the one derived from a statement by C. E. Wilson, president of General Motors Corp. He said recently that GM had contracts already signed, or in process of negotiation, for $1,200,000,000 worth of war materials. He added that on the basis of total facilities and total employment at that time General Motors could handle almost twice that total of defense orders. It is doubtful whether he was talking in terms of 168 hr. per week for utilization of productive equipment. Whether estimates were based on the 40-hr. week or 80-hr. week (two shifts) it seems reasonable that "capacity" is still far from being all used up.

War orders that will be pushed at the industry in the next few weeks and months cannot be estimated in advance. However, the victory program, said to call for $150,000,000,000 output, represents roughly a tripling of the immediate goal. On that basis the cumulative orders of the automobile industry should rapidly increase, maybe tripling present totals, and should eventually offer employment for every facility.

In all fairness to this nation which is in peril, it is imperative not to make the mistake of translating cumulative orders into rates of delivery, forgetting that it still takes time to tool up. The new orders, like the original ones, will require from 6 to 18 months to create facilities, depending upon the nature of the product and previous preparation for its manufacture. Orders that are on the books will, for the most part, be well into production by the end of 1942, but delivering goods to our fighting men on new orders now pending must necessarily depend in part on how fast the go-ahead signal is given by the government. Prospects do exist for unlimited output of war goods in 1943, assuming that the pace will be stepped up from now on.

The most spectacular phase of the automotive industry's transition is its undertaking to use its talents and facilities to help airplane builders in fulfilling the President's demand for 50,000 planes a year. That goal is in sight.

Military output in 1941, although somewhat cloaked by wartime secrecy, has been set by OPM at approximately 20,000 airplanes. This represents much more than a doubling of output over the preceding 12 months. Moreover, the 20,000 airplanes built in the last year are preponderantly fighter type planes, with the ratio of fighters to trainers passing the 50-50 mark early in 1941. U. S. output appears now to equal or exceed that of the Nazis and is substantially greater than that of the British. These two have been estimated as having potentials of 2400 and 1500 per month, respectively. At the outset, Germany is said to have been able to produce 3000 airplanes per month, but probably is not able to reach that level easily in these times. The rate of increase in airplane production here will pass that mark in a few months.

Immediately after the beginning of the Japanese war, OPM Director William S. Knudsen stated that the heavy bomber schedule would be increased from 500 per month to 1000 per month. The 500-per-month schedule for the four-engine bombers is quite a ways from realization yet, but will be reached when the new airplane plant facilities are in full swing and are joined by auto-

motive plant output of parts, subassemblies and completed bombers during 1942.

The Aeronautical Chamber of Commerce has estimated that the 50,000-plane-a-year rate will be reached in 1942. It adds that aircraft engine horsepower production each month now is equivalent to that needed for 1000 heavy four-engine bombers, or 3000 to 6000 single-engine or twin-engine fighters each month.

By an extension of figures presented in THE IRON AGE, June 5 last by J. H. Van Deventer, the production of 1000 heavy bombers per month, as now projected by Knudsen, would require a labor force of 900,000 men. The total labor force that will be required for the American aviation program appears to be headed now in the direction of 1,500,000 or 2,000,000 men.

In studying the productivity of the industry, statisticians are hampered because the door is shut to obtaining many figures that relate to the war program. However, intimate association in the industry and close study of the work being done provides convincing proof that a majority of projects are ahead of schedule and that with very few exceptions everything else is on schedule.

For example, one company's undertakings include five major projects of which four are ahead of schedule and one is now just making its quota.

The undertaking of the war program by management, engineers and production men in the industry is being paralleled by a switch of research efforts from normal channels to the development of materials and products for military use. This change-over is not as marked as that in the production field, because fundamental research is the same whether its application is in an automobile engine or military plane engine or tank engine. But the benefits to be gained—by the nation's military services and in future peacetime activities—will be great indeed. There is now an acceleration of research activities and a speeding down the road toward final results that did not exist a year ago. Perhaps in some cases the industrial researcher may have had a chance to become a trifle academic but, if so, he will be jarred out of the rut, and important contributions to the national welfare will result.

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BREAKDOWN of cumulative orders. This shows the change in emphasis on motor vehicles, aircraft, tanks, marine equipment, munitions, etc.

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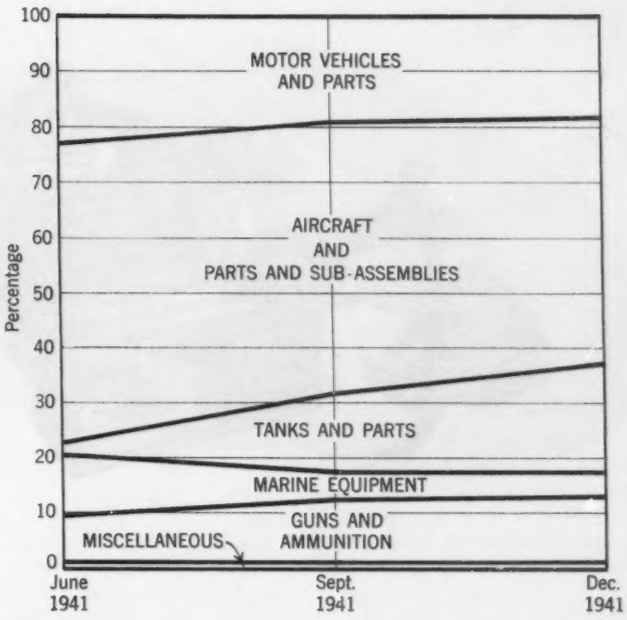

Automotive-wise, a few of the possible contributions have already been outlined by leading research experts. One points out, for instance, that the industry had pretty well perfected automotive vehicles for highway travel, and was a little complacent about it. Now engineering laboratories are faced with the problem of turning out military vehicles that will travel just as well where there are no roads. What is learned in that effort will be reflected later in passenger cars of all sorts—road and rail. Railroad boxcar suspension systems are currently a problem being solved by automotive engineers. "One-speed railroading" is the goal now because it is desired to operate freight trains just as fast as passenger trains travel.

When the United States as a whole begins tightening its belt, the civilian population will be told to operate its cars on relatively low-grade gasoline, perhaps as low as 50 octane number, equivalent to about the best available during the last war. One of the scientists responsible for ethyl gasoline predicts that the industry will find some way to use even such low-grade fuels efficiently. "And when the war is over and there are plentiful supplies of 100 octane gasoline it will be possible to make more efficient use of that as a result of our wartime experience," he predicts. "The automobile that won't travel 50

(CONCLUDED ON PAGE 196)

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VOUGHT-SIKORSKY wing tips from an automobile plant—the first application of automobile production methods to bomber parts manufacture. Here in the Briggs Mfg. Co.'s Conner airplane parts plant, Detroit, hundreds of men every day turn out complete wing sections, bomb doors, intricate duct work and other important parts.

Machine

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By FRANK J. OLIVER
Machine Tool Editor,
The Iron Age

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AFTER going through the largest expansion program in its history, the machine tool industry in the middle of December was called upon by OPM officials to increase its output by 50 to 100 per cent. This means that shipments this year will range between $1,150,000,000 and $1,530,000,000 —a figure three times or more the 1940 dollar volume. "The heat is on—we are going to demand a great many more tools," was the way William S. Knudsen, general director of OPM, put it on Dec. 17.

This means a continuation of the expansion program the industry has been carrying on since 1939. Yet only the week before, leaders in the industry privately had expressed the belief that the output of machine tools would shortly be in balance with the capacity of new war industries to absorb them. The inference is, therefore, clear that all contributing industries from the mines out will have to step up the tempo of their expansion programs. For it must be obvious that the new time-tables will have to be made out, not so much on the basis of when the necessary machine tools can be delivered, but when the new raw material facilities will come into production, when the new buildings will be ready, when the new shipways will be completed, when the airplanes will be fabricated to take the aircraft engines, etc. There are so many places where temporary unbalance in the conversion of raw materials to finished product may occur that even with the fresh load about to be placed on the shoulders of the machine tool builders, it is hardly fair to call that industry a bottleneck. As the war has expanded, however, the demand for machine tools has literally became insatiable.

Trend of Shipments

Chart No. 1 shows the trend in machine tool shipments (and also exports) on an annual basis from 1929 on, tracing the descent into the abysmal depths of 1932 when the total dollar volume for the year was barely one-third of shipments in the month of September, 1941, to the dizzy heights of 1941. Chart No. 2 takes the last two years and breaks down shipments by months. On this basis, the gain in dollar volume between January and December, 1940, is about equal to the gain between January and November, 1941 (last available figure). A reasonable estimate for the year places the figure somewhat above the goal of $750,000,000 set as early as last February — perhaps $765,000,000. If we take the October peak figure of $77,200,000 and multiply by 12, we obtain an annual volume of $925,000,000. Assuming that the month-to-month pickup in volume continues, even though a slight dip was recorded in November (to $74,600,000), it is likely that the billion-dollar annual mark, calling for a monthly volume of $83,500,000, will be passed early this year and shipments be carried to much greater heights by year end.

Measurement by dollar volume of shipments is subject to one error, of course, which is the price element. It is obvious that machine tool prices have advanced over the years. Technologic advance has been the largest contributing element. Today's machine tool, compared with its nearest counterpart even 10 years ago, is a much sturdier unit, takes much heavier cuts without appreciable deflection or harmful vibration; has much greater range of speeds and feeds, larger power, greater maintained accuracy; and makes widespread use of anti-friction bearings, ground and lapped headstock gears, hardened ways, automatic lubrication, elaborate hydraulic cycles and intricate interlocking electrical mechanisms—all of which factors add up to increased quality and higher unit costs. The upsurge in use of more elaborate tooling, often costing as much as the stripped machine itself, and special-purpose set-ups, has also tended to render year-to-year comparisons of prices of standard tools an inaccurate guide to price trends in the industry as a whole.

Add to the above, in the past two years, the highly important element of labor costs in machine tool prices. As a matter of fact, factory costs—principally wages—have gone up much more rapidly than selling prices. Chart 4, showing the trend in employment and wages within the industry since 1928 clearly indicates the rapidly widening spread between employment and payrolls in the last few years. Between January, 1939, and September, 1941, for example, whereas the index of employment rose 180 per cent, the index of payrolls rose 350 per cent. The answer lies in the payment of "time and a half" for any time over 40 hr. per week (the average work week of the industry is now about 54 hr.) and the payment of generous bonuses. In one notable case, a New England company gave two wage

Tools BEHIND THE WAR...

• *First to be drawn into the defense effort, the machine tool industry is now fully geared up to meet the further demands of our expanding war industries.*

increases and paid three bonuses in 1941 alone; in an Ohio plant, workers have been receiving regularly a 30 per cent bonus with each paycheck.

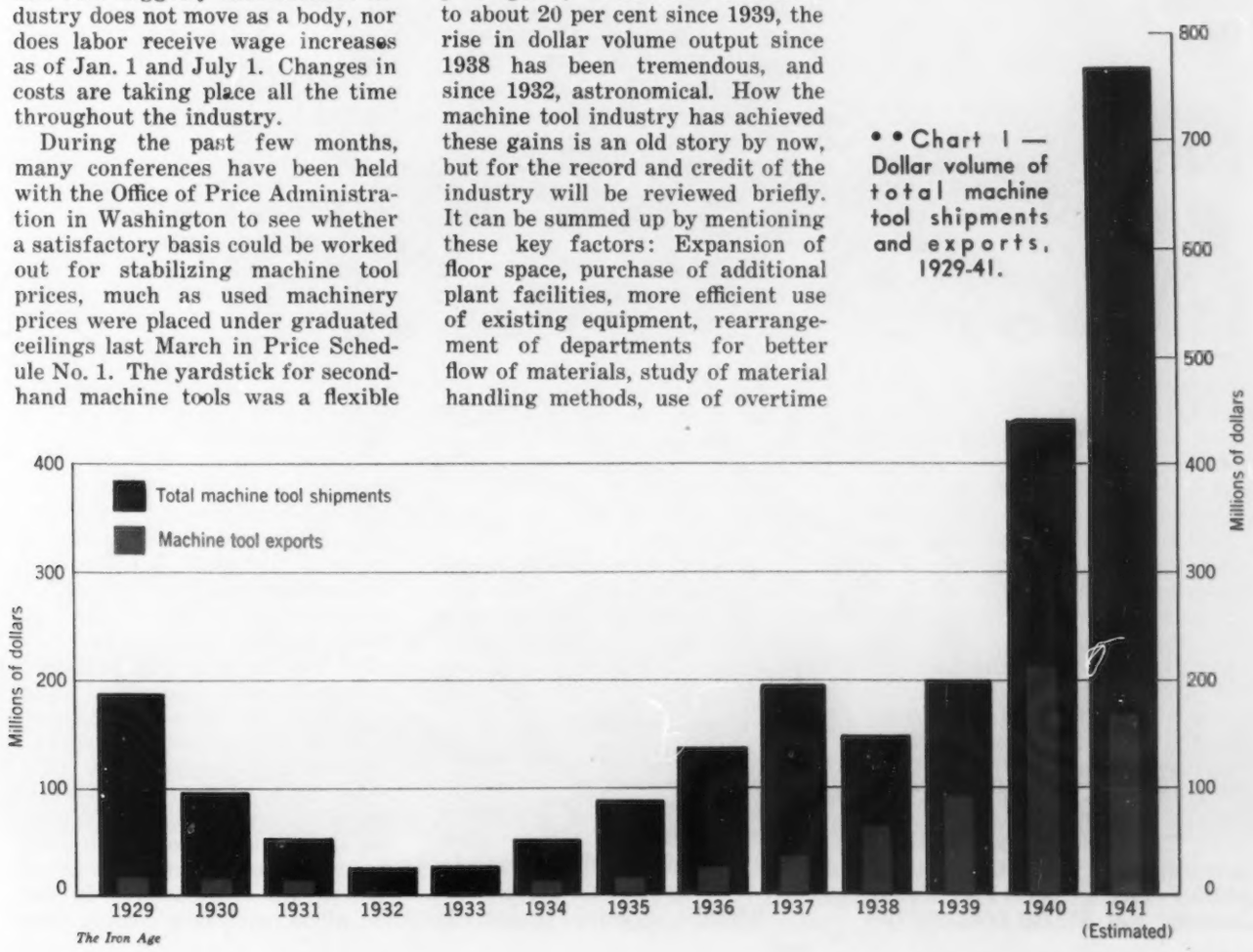
The industry has tried to protect itself against rising labor costs by the use of the so-called escalator clause in its contracts with the Army and Navy and their suppliers. The method of calculation, tying in with the Department of Labor index of wage levels for the machinery industry (which covers a much broader ground than machine tools) and prorated according to percentage of labor cost to total cost, is somewhat complicated. Lately, one of the service branches had tried to modify the clause by making such changes effective only every six months, forgetting that this still ruggedly individualist industry does not move as a body, nor does labor receive wage increases as of Jan. 1 and July 1. Changes in costs are taking place all the time throughout the industry.

During the past few months, many conferences have been held with the Office of Price Administration in Washington to see whether a satisfactory basis could be worked out for stabilizing machine tool prices, much as used machinery prices were placed under graduated ceilings last March in Price Schedule No. 1. The yardstick for secondhand machine tools was a flexible one, though, inasmuch as it was tied in on a percentage basis to new machine tool prices. OPA has taken the stand that new machine prices, even though "frozen," could later be modified provided the manufacturer brought evidence down to Washington to justify a price advance based on demonstrated increased costs. Pending a final ruling to be issued shortly, the industry was asked to stabilize prices as of May 6, 1941.

But even making allowances for price gains, which have amounted to about 20 per cent since 1939, the rise in dollar volume output since 1938 has been tremendous, and since 1932, astronomical. How the machine tool industry has achieved these gains is an old story by now, but for the record and credit of the industry will be reviewed briefly. It can be summed up by mentioning these key factors: Expansion of floor space, purchase of additional plant facilities, more efficient use of existing equipment, rearrangement of departments for better flow of materials, study of material handling methods, use of overtime and multiple shifts, and finally subcontracting of machines either in whole or in part, not to forget the entry of new firms into the industry or the revival of old ones that had been dormant for years.

Some firms, notably in the New England area, had begun to expand as far back as 1938 when the principal foreign buyers — England, Russia, France and Japan—stepped into this market in a big way, most of them bent on increasing aircraft

• • Chart 1 — Dollar volume of total machine tool shipments and exports, 1929-41.



production. Placing of about $80,000,000 of French orders in the fall of 1939 started many a machine tool expansion program. In his annual report to the National Machine Tool Builders Association last October, F. V. Geier, retiring president, indicated that when orders for machine tools began to be placed in volume in the fall of 1940, over 2,400,000 sq.ft. of floor space and the necessary machine tool equipment had already been added during the preceding 12 months by 67 companies in the industry, acting upon their own initiative and with their own funds. At that time, 15 additional companies then had under way building programs involving another 1,400,000 sq.ft. of floor space and 17 companies had expansion projects not detailed as to floor space.

Another significant index of how the industry has met the emergency is revealed in the fact that 140 companies received "Certificates of Necessity" from government agencies for plant and equipment expansion undertaken after June 10, 1940, and including certificates issued through Oct. 31, 1941. The first certificates were not acted upon, it should be explained, until January, 1941. The amount involved was $59,051,000. To this should be added for proper perspective of the entire related industries, $13,331,000 for plant and equipment expansion of makers of small tools, cutters, jigs, fixtures, dies and gages; also, $1,047,000 worth of certificates issued to makers of machine tool components and machine tool castings. All these companies, listed in detail at the end of this article, utilized their own resources for this expansion. The lists do not include the more recent expansions of 27 companies employing Government Emergency Plant Facilities Contracts for $23,500,000. For proper perspective, it should be noted that the industry normally is composed of 250 machine tool builders with an invested capital of $150,000,000.

Latest data from the association indicate that 55 companies are still adding to building capacity, which will not become fully available until the end of the first quarter of this year.

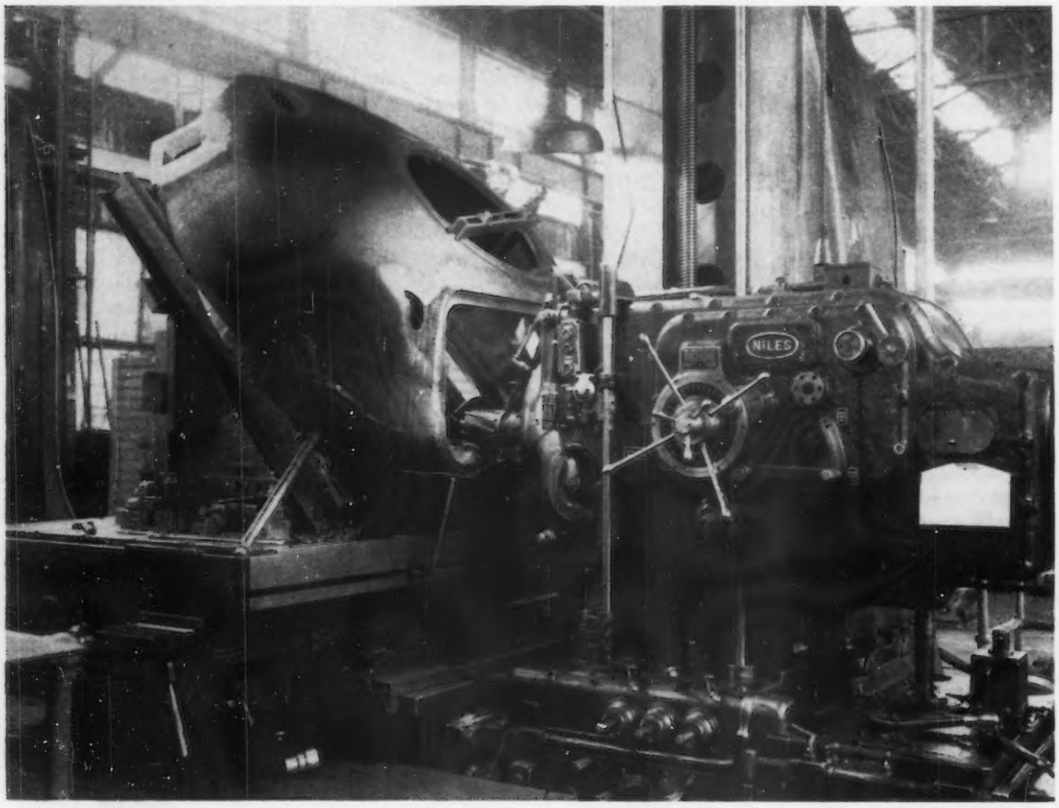


Photo by courtesy of Baldwin Locomotive Works.

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••Milling a cast steel turret for the M-3 tank.

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Increased Efficiency

A great deal has been accomplished in increased manufacturing efficiency which is impossible to record statistically. These gains have been made in all departments, from the foundry out. Installation of hydraulic cleaning equipment, for example, has cut down the time of knocking cores out of large bed castings to a fraction of the original time when the work was done by hand. Jolting rollover machines have been applied to the molding of heavy column castings in flasks measuring up to 6 x 10 ft. or thereabouts. Heat-treating facilities have been improved and the use of degreasers and electrolytic cleaners has speeded up the removal of quenching compounds and scale from hardened parts. The newer types of furnaces and controls have replaced much slower and less efficient apparatus.

In the machine shop, rearrangement of machine tools has resulted in a smoother flow of work in process and elimination of backtracking. Larger volume has also made the machine tool builders conscious of savings obtainable through material handling equipment, which runs the whole gamut of cranes, monorails, hoists, industrial trucks with skid platforms and bins, and even mechanical floor conveyors for final assembly operations.

Larger quantities involved have also enabled parts to be put through the shop in larger lots, with consequent less down time of machinery due to tool changeovers. In fact, the whole industry is coming closer

• • Titan's Forge. Start of the forging of the main tube of a 16-in. naval gun from an ingot weighing nearly 100 tons. This huge 14,000-ton hydraulic forging press is installed in the nation's largest private armory—the Bethlehem plant of the Bethlehem Steel Co.

to adoption of mass production methods than it ever has in its entire history. Up until recently, most machine tool plants, with a few notable exceptions, were mostly glorified job shops because of the diverse character of the work and the short runs involved. Predominantly, however, machine tool plants are still departmentalized by type of equipment—planers, lathes, turret lathes, grinders, etc.—although more companies have adopted line production methods for processing complete parts like bases or headstocks down a progressive line, with a radial drill next to a planer and a horizontal boring mill next to the latter, etc.

One of the biggest gains in efficiency has been obtained through the use of carbide tipped tools. In the turret lathe department of one large plant, a 30 per cent increase in output has been credited to the adoption of steel cutting grades of carbides in place of high speed steel. Large bed castings are also being planed at heretofore unheard of speeds with carbide tools. Other castings are being face milled at 250 ft. per min.

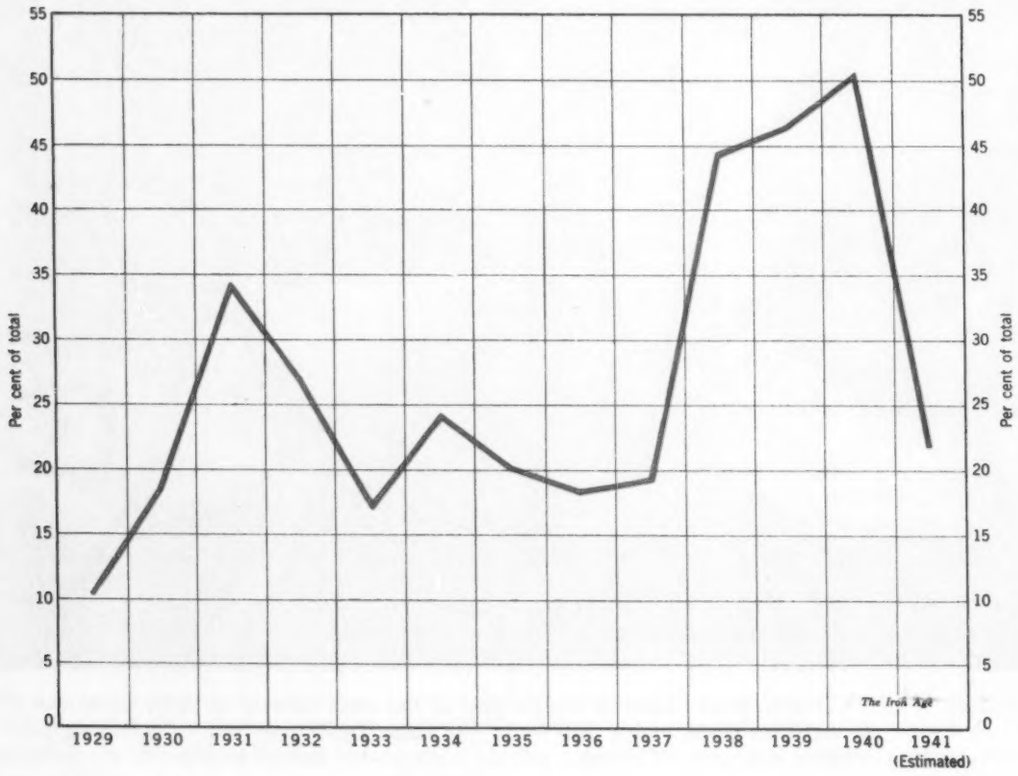
Problem of Multiple Shifts

Use of multiple shifts was an early means adopted for increasing output, and this factor had largely influenced the increase in employment that has taken place. A little over two years ago, 110 firms in the industry, accounting for 90 per cent of the employment, had 44,000 men on their payrolls. In September, 1940, this figure had risen to 68,000, and in September, 1941, to 92,000. The Department of Labor's estimate for December is about 102,000 for the entire industry. Despite this great increase in employment, the industry still has over 12,000 men in training. The training problem, incidentally, has been successfully licked on the basis of short term programs for developing individual machine operators rather than all-around mechanics.

Over 99 per cent of the workers in the industry are in plants running on a two or three-shift basis. As of last September, 53 per cent of all employees were in three-shift plants, and 87 per cent of the plants were working over 100 hr. and up to 168 hr. per week (theoretical maximum). The average work week per shop worker is around 54 hr., excluding office and engineering personnel. This is the highest work week of any American industry. Some plants are working their men up to 63 hr. per week.

It is realized, of course, that no man will be asked to work more than six days a week, but seven-day operation of machine tool and other war industry plants recently has been called for. This is going to be difficult, if not impossible, to attain for those plants now on a three-shift basis, if a 24-hr. rest period is to be observed. At least one plant working on two long shifts has attained a seven-day plant week by an ingenious arrangement of staggered shifts. Another plan makes use of the staggered "Sunday," that is, the rest day is progressively advanced from week to week. The most serious impediment to the seven-day week, however, is the extra burden placed on supervisory personnel. Training these men is a much more serious problem than training machine operators.

Attaining proper balance between shifts is another difficult problem. Perfect balance is not even an ideal to strive for. In fact, on a two-shift basis, the more practical ratio of 7:10, in comparing number of workers on night versus day shifts, is a goal that few machine tool plants have yet achieved. With three shifts, the number of men employed on the "graveyard" shift is still not up to what government officials think it ought to be. It is in adding more workers on these later shifts that the greatest gains in output are to be made, *provided* the rest of the plant operations are not thrown out of balance. In many plants, for example,



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• • Chart 2 — Dollar volume of total machine tool shipments and exports by months. Shipment figures are from National Machine Tool Builders' Association, exports from the Department of Commerce. No export figures are available after September, 1941.

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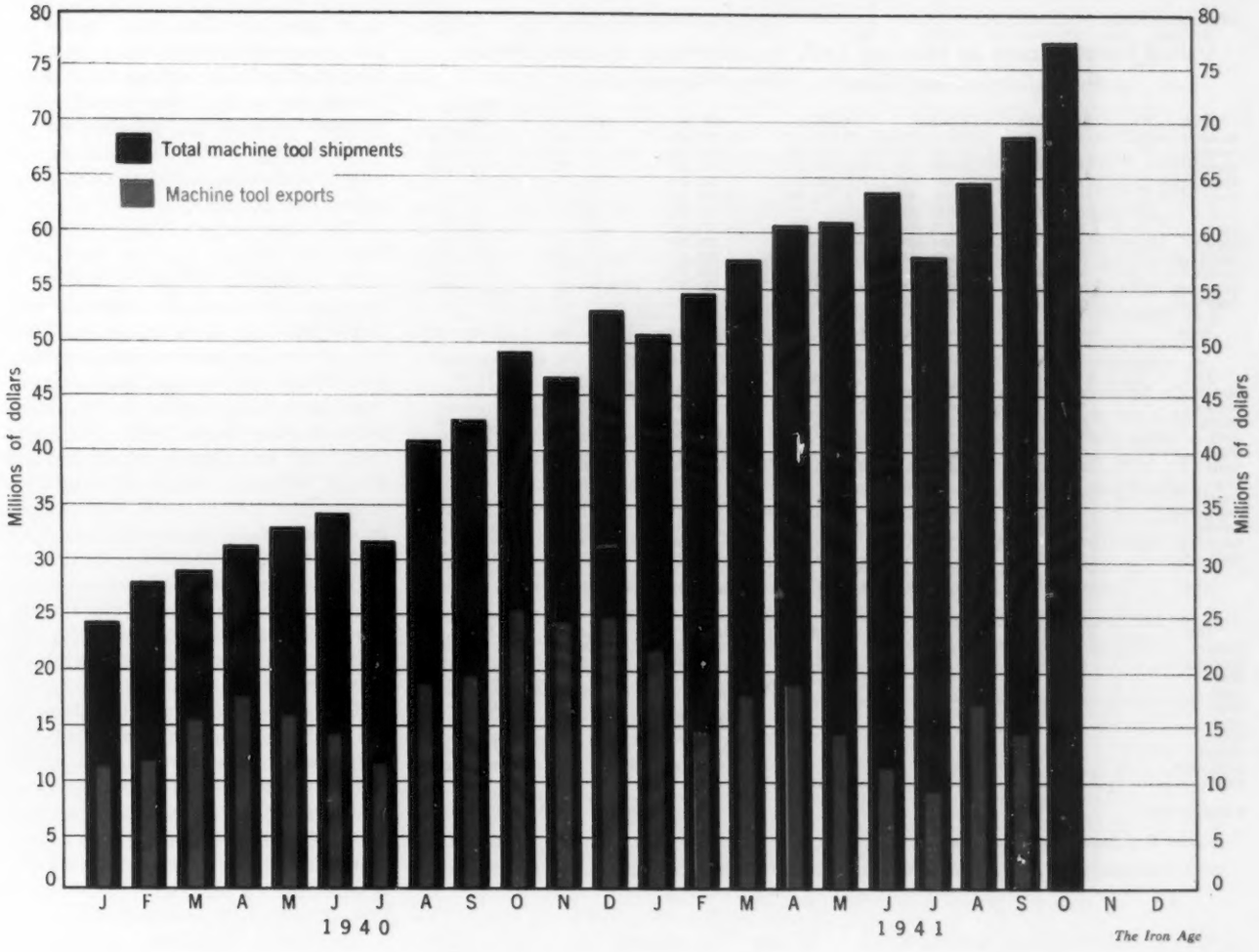
• • Chart 3 — Machine tool exports in terms of percentage of total shipments.



only certain large machines like planers or critical units like gear grinders are the bottlenecks. These units are frequently being run 24 hr. a day, seven days a week. To put the entire plant on such a basis would only aggravate such bottlenecks until additional facilities could be obtained.

Use of Subcontracting

One way of achieving balance in production is to subcontract, not only units but operations, like planer work. The machine tool industry was one of the first to use subcontracting extensively. A recent survey made by the National Machine Tool Builders' Association of its membership, though incomplete, shows about 80 per cent of the plants subcontracting parts. Of this number, 39 are subcontracting whole machines, chiefly to manufacturers of printing presses and textile machinery—to concerns like R. Hoe & Co., Miehle Printing Press & Mfg. Co., Mergenthaler Linotype Co., Intertype Corp., Wood Newspaper Machinery Co., Draper Corp., Mohawk Carpet Mills, American Can Co., Westinghouse and Fisher Body division of General Motors, to mention a few.

Subcontracting of parts is one of the important factors relating to costs. Work done on the outside, particularly subcontracting of operations rather than units, is much more costly than work done in the company's own shop—often running up to twice as much. Yet from their side of the picture, subcontractors feel that they cannot make enough money on this class of work, and in some instances have dropped subcontracting in favor of direct contracts from the government for ordnance or aircraft work.

New Faces

The entrance of new firms into the industry or the revival of old ones has also aided in boosting total output. In five important machine tool groups alone, in addition to the 54 pre-war builders, there are now 45 new sources of production, and for all types of machine tools there are at least 72 new machine tool producing sources other than the subcontracting sources previously mentioned. The industry itself has been quick to encourage and assist in the development of these sources. One of the first groups to come in were the rebuilders of used machine tools. Several are now devoting the greater part of their efforts to making new machinery and have also jobbed out whole machines.

In looking over the products of new companies that have entered the machine tool industry in the past year or so, three or four machines seem to be the popular choice. First place goes to the light manufacturing miller, the No. 2 size, to be exact; next comes the light ram-type turret lathe, the No. 2 size again, by coincidence; and then small grinders, particularly small surface grinders. The market possibilities in the small arms manufacturing field are probably what attracted the newcomers.

Changing Requirements

War needs have caused an unbalance in machine tool capacity built up on the basis of normal peacetime needs. The large, heavy

United States Exports of Machine Tools by Months, to England, France, Russia, Japan and Canada, 1939, 1940 and 1941

1939	ENGLAND	FRANCE	RUSSIA	JAPAN	CANADA	WORLD TOTAL
January	$782,001	$491,620	$1,114,804	$1,870,476	$285,465	$5,108,734
February	839,676	763,287	1,588,369	2,063,891	214,290	6,414,069
March	1,108,034	1,055,112	3,151,774	2,772,419	219,588	9,500,285
April	1,122,960	1,421,713	1,349,167	1,376,964	163,305	6,411,037
May	1,792,358	1,925,338	1,183,189	2,505,644	342,150	9,340,445
June	1,576,690	1,442,455	.....	1,398,379	228,033	5,732,542
July	2,381,459	2,013,441	1,545,683	1,133,350	268,212	8,182,038
August	2,273,456	1,804,827	1,314,970	1,376,730	344,287	8,182,774
September	2,959,598	1,918,024	376,854	1,408,814	432,323	7,904,437
October	3,394,033	1,578,622	793,491	900,872	479,320	8,046,187
November	2,695,145	884,653	1,613,365	1,430,833	405,371	7,838,879
December	4,644,335	1,804,664	1,382,602	1,573,154	531,425	10,742,345
Total	$25,569,745	$17,103,756	$15,414,268	$19,811,526	$3,913,769	$93,403,772

1940	ENGLAND	FRANCE	RUSSIA	JAPAN	CANADA	WORLD TOTAL
January	$4,476,881	$1,791,172	$1,748,577	$2,279,854	$437,080	$11,628,234
February	5,114,191	2,866,784	1,445,173	1,236,291	341,343	12,022,454
March	5,009,607	4,412,095	2,109,785	2,370,560	526,513	15,633,850
April	5,202,015	6,679,538	2,229,764	2,006,319	619,797	17,910,735
May	5,744,189	6,567,735	91,946	1,972,345	508,970	16,205,128
June	4,966,898	6,023,335	995,814	864,062	639,025	14,322,047
July	7,954,726	203	1,394,167	1,322,502	635,322	11,922,063
August	12,480,621	.....	1,795,826	1,875,503	1,582,273	18,913,680
September	15,070,249	.....	894,999	587,632	2,181,304	19,847,805
October	19,902,633	.....	125,701	1,393,434	2,678,330	25,601,965
November	19,218,029	.....	1,025,208	478,008	2,614,978	24,835,175
December	19,574,246	.....	459,960	664,349	3,006,449	24,982,692
Total	$124,714,285	$28,340,862	$14,316,920	$17,051,359	$15,771,384	$213,825,828

1941	ENGLAND	FRANCE	RUSSIA	JAPAN	CANADA	WORLD TOTAL
January	$16,902,682	.....	$95,238	$217,268	$3,806,043	$22,045,500
February	8,674,766	.....	484,582	16,930	4,272,527	14,908,042
March	.....	.....	.....	.....	.....	17,947,336
April	.....	.....	.....	.....	.....	19,021,588
May	.....	.....	.....	.....	.....	14,389,047
June	.....	.....	.....	.....	.....	11,233,804
July	.....	.....	.....	.....	.....	9,226,262
August	.....	.....	.....	.....	.....	17,124,342
September	.....	.....	.....	.....	.....	14,274,854
9 Months' Total						$140,170,776

Source: U. S. Department of Commerce

castings and forgings encountered in both Army and Navy ordnance work, including tank construction, calls for a tremendous number of horizontal boring, drilling and milling machines. There has probably been more new capacity added for building this class of machine tool than for any of the other heavy types. There were only two leading makers of precision internal grinding machines in the country, yet this class of machine tool is in great demand for aircraft work. Another machine used widely in the aircraft industry and also the gage industry is the thread grinder, a machine unheard of in the last war. Two newcomers in this field of manufacture have joined the two previously established producers, both of whom have greatly enlarged plant facilities. Thread millers enjoyed a rather restricted field of application up until the armament program started in earnest. This branch of the industry is now greatly expanded and is seeing some new faces.

Gun drillers and rifling machines are items strictly related to the war program. Machines not built since the last war have been put into production once more and two new methods of rifling have been introduced — by the wafer disk method of multiple passes and the broaching process. This is an example of equipment that has no peacetime parallel.

The two-ocean Navy program and the closely related merchant ship program is also having a marked influence on machine tool requirements. In fact, it is these two programs more than anything else that has made large, heavy machine tools so critical. Manufacture of propulsion units for ships calls for equipment much beyond the commercial range. Up until a year ago, for example, the largest gear hobber commercially available had a nominal capacity of 120 in. Today, the range has been extended up to 160 in., and one of the largest producers of maritime gear sets has built for its own use several hobbers of 200 in. capacity.

There has also been a big demand for plate planers and pit planers, both used in finishing armor plate. Big lathes 200 ft. long, for turning and boring 16-in. naval guns are also being built. Except for a few machines that were shipped to Russia two years ago, none have been made since the last war.

Another well known example of changing war needs as it affects machine tool requirements, is the four-motor bomber program. As the importance and vital character of long range bombers became apparent, a program was set up for building at the rate of 500 bombers of this type a month by the end of 1942. Before 1941 was out, however, this objective had been doubled. This means more machine tools for the aircraft engine builders and their subcontractors primarily, for it is these manufacturers who absorb about 90 per

200
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Index
Index numbers without seasonal variations, compiled from the Bureau of Labor Statistics, U. S. Department of Labor
Payrolls fell more rapidly than did employment in 1930, indicating the tendency to maintain the working force and shorten the work week.
Employment
Payrolls
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cent of the machine tools used in the entire aircraft industry—they and the landing gear and propeller makers. The requirements for machine tools, however, will probably not be doubled, since the larger objective will permit more elaborate set-ups and more nearly mass-production methods.

Aircraft the Pace Setter

Incidentally, it is the primary aircraft engine contractors and not the automotive subcontractors that are setting the pace in the application of machine tools on such a basis. The 56-station automatic transfer machine installed at the Cincinnati plant of the Wright Aeronautical Corp. for drilling, boring and tapping cylinder heads, for example, is far ahead of any special-purpose equipment installed in automobile plants for making similar aircraft engines and, in fact, represents an advance over the best practice in the latter industry on strictly automotive work. Many of the automotive subcontractors have installed much more general purpose equipment, involving only a moderate amount of special tooling.

During the few months preceding the entrance of the United States into the war, machine tool shipments on the whole were exceeding the volume of incoming orders, if for the moment we leave out of the picture the controversial factor of pooled orders. This situation was as much created by a steadily rising output of machine tool shipments from month to month (see Chart 3) as to a lessening volume of new orders. Immediately following the declaration of war on Dec. 8, there was a burst of new buying, largely attributed to the "jelling" of new armament projects that had been hanging fire for months. This statement does not take into account the announcement of Mr. Knudsen on Dec. 10 that the four-motor bomber program was to be raised from a contemplated production of 500 planes a month by the end of 1943 to double that figure. Actually, the aircraft and engine manufacturers involved, including subcontractors, had known of this doubling of the program some months before. It was rather the reflection of the release of a host of miscellaneous Army and Navy contracts to a wide cross-section of industry.

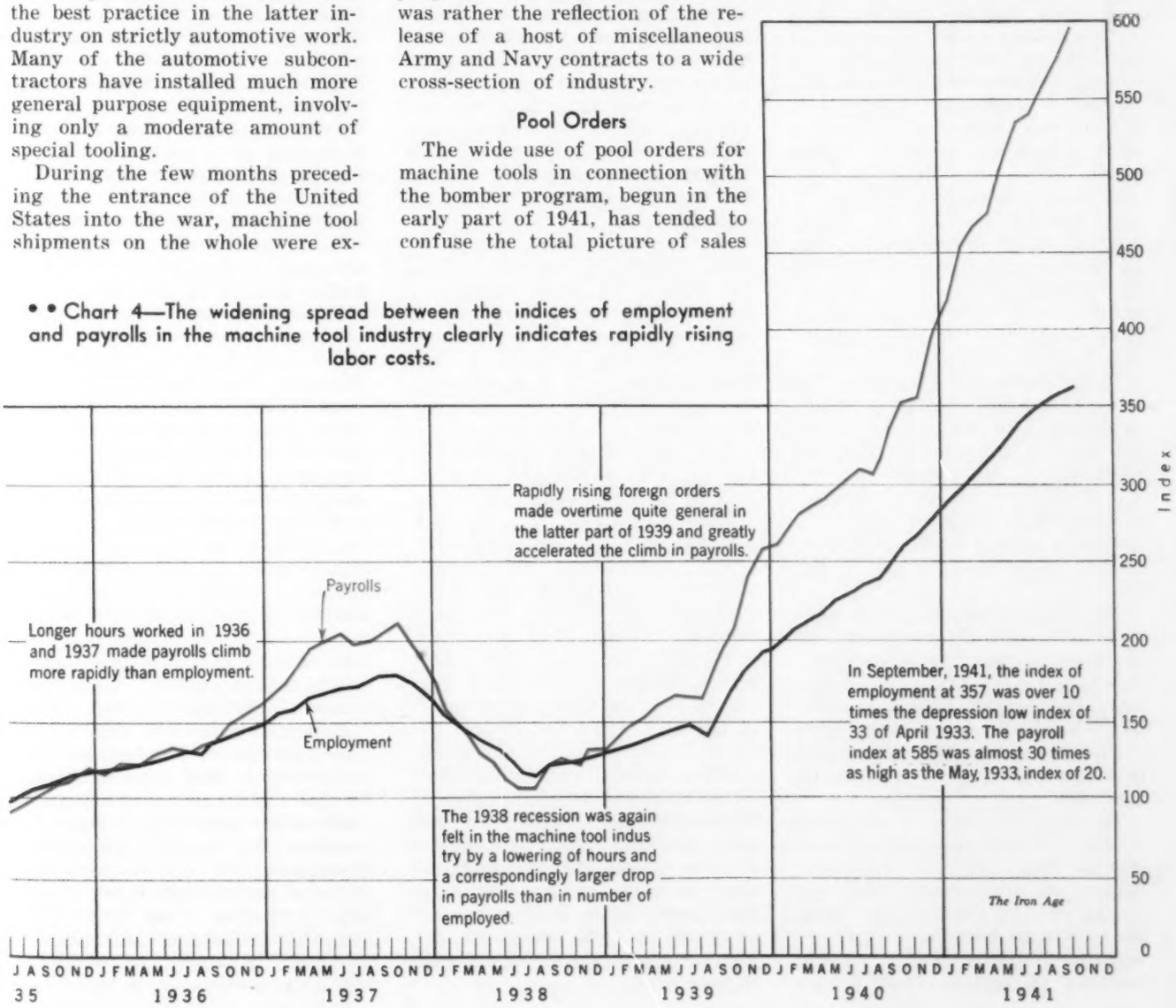
Pool Orders

The wide use of pool orders for machine tools in connection with the bomber program, begun in the early part of 1941, has tended to confuse the total picture of sales trends, since some sellers looked upon them as firm orders and included them in their order backlogs, while others merely regarded the pool order as a protective device in case the program should suddenly be dropped. These pool orders covered thousands of machine tools and were issued by the U. S. Army Air Corps at Wright Field in order to insure that aircraft subcontractors would get the tools when needed. The prime contractors were left to their own iniative. One milling machine company alone received two such pool orders for 2300 machines, with an overall value of $13,821,000. The total amount of pool orders placed in 1941 amounted close to $200,000,000, or about one-quarter the dollar volume of machine tools shipped last year.

The reason many machine tool

(CONTINUED ON PAGE 205)

• • Chart 4—The widening spread between the indices of employment and payrolls in the machine tool industry clearly indicates rapidly rising labor costs.


Rapidly rising foreign orders made overtime quite general in the latter part of 1939 and greatly accelerated the climb in payrolls.
Payrolls
Longer hours worked in 1936 and 1937 made payrolls climb more rapidly than employment.
Employment
In September, 1941, the index of employment at 357 was over 10 times the depression low index of 33 of April 1933. The payroll index at 585 was almost 30 times as high as the May, 1933, index of 20.
The 1938 recession was again felt in the machine tool industry by a lowering of hours and a correspondingly larger drop in payrolls than in number of employed.
The Iron Age
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Index
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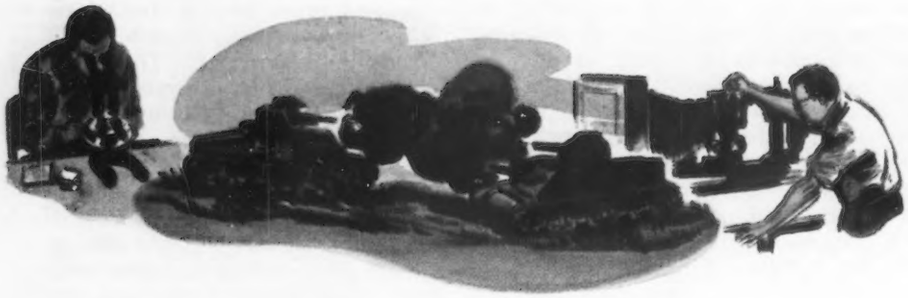

Metallurgy F

By B. W. CORRADO
The Iron Age

THIS present war may well show that the metallurgist is mightier than the sword. It would be perfectly possible for some unknown worker in an obscure laboratory to exert more influence on the ultimate result of the conflict than a hundred divisions on the battle front. The day-to-day demands of armament are already accounting for much of the metallurgical ability in this country, and an indeterminate amount of energy has already gone into the development of cast armor plate, proper heat treatments for rolled armor, improved bullet cores for armor-piercing shells, improved alloys for gun mechanisms, stainless steels, aluminum and magnesium alloys for aircraft, brass coated steel for shell casings, development and control of all the multitude of processes involved in equipping and mechanizing a mass army on the ground, on and under the sea, and in the air.

But, at the same time, work goes on to solve some of the conventional problems of peace-time industry. All of the year's work in metallurgy and related fields cannot possibly be dealt with in detail here. However, some of the interesting data developed here and abroad can be set forth.

As usual, the bulk of attention during the year was centered in ferrous alloys, the data on chromium and chromium-nickel steels being particularly interesting. There has been a growing tendency to investigate the influence of small percentages of certain unusual elements in steel, as for instance, titanium and columbium for stabilizing stainless steel, selenium in free machining stainless, etc. A more recent development is bismuth in stainless steel to secure free machining qualities and welding properties and other advantages. This was announced for the first time at the A.S.T.M. convention in Chicago, June 26.

H. Pray, R. S. Peoples and F. W. Fink, of Battelle,[1] pointed out that the addition of small amounts of bismuth (0.1 to 0.5 per cent) to stainless steels results in a remarkable and useful increase in their machinability, with no detriment in corrosion resistance. In some cases the latter is actually improved.

Saw and drill tests were made on cast 25 Cr-12 Ni and 19 Cr-9 Ni alloys as reference materials and on similar castings to which sulphur, selenium, molybdenum, phosphorus, copper, silver, lead and bismuth, alone or in combination, were added.

Sulphur and selenium, of course, improved machinability, but affected corrosion resistance. Silver gave erratic results, possibly due to difficulties in properly incorporating it in the melt. Lead was helpful but its introduction entailed difficulties.

When bismuth-containing alloys were tested, the beneficial effect of this element on machinability was quite obvious. Plant trials showed it to be entirely feasible to introduce bismuth under commercial conditions—the recovery was usually 0.20 to 0.30 per cent Bi, whether 1 per cent or 0.5 per cent Bi were added.

Mechanical properties, weldability and corrosion-resistance are not deleteriously affected by bismuth additions. However, the decreased ductility observed in short-time high-temperature (1800 deg. F.), tension tests indicates that care will be needed as to the *type* of high-temperature service imposed on such steels, although load carrying ability appears satisfactory. Hot-working of bismuth-containing alloys must be done at slightly lower temperatures.

In Britain, patent No. 534,198 describes a new age-hardening nickel alloy. It is pointed out that improved properties can be produced by age-hardening in alloys containing specific amounts of magnesium, carbon and titanium. Accordingly, fabricated articles, hardened by age-hardening, are made from alloys which contain titanium from 0.36 to 1 per cent and preferably between 0.4 and 0.5 per cent, and also magnesium between 0.2 and 0.45 per cent (preferably 0.3 to 0.4 per cent) and carbon between 0.15 and 0.5 per cent (preferably 0.2 to 0.3 per cent). Remainder consists essentially of nickel.

Both in Europe and in the United States, manganese has been studied intensively to find substitutes for the more highly alloyed steels, especially those containing nickel. In Germany this has resulted in the specification for aircraft purposes of chromium-molybdenum steel and other low alloy steels containing nickel, chromium and molybdenum which, within certain limits of section, give excellent properties in the

...Fights on Two Fronts...

...Thousands of metallurgists have shifted their attention to war problems, but a great deal of work continues along conventional lines. Of considerable interest are new data on stainless steel, development of new aluminum alloys, plating of metals onto non-metals and increasing application of silver.

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heat treated condition. Steels investigated[2] were tested for susceptibility to overheating, to air hardening and to temper brittleness, and their response to tempering and mechanical properties in the hardened and tempered condition was determined. It was concluded that manganese steels (1.3 to 1.7 per cent manganese) were suitable substitutes for chromium-molybdenum steels. Steels in which manganese was the chief alloy element could not, however, be recommended, on the basis of the results obtained in this investigation, as substitutes for the nickel-chromium-molybdenum aircraft steel known as 1460.

The possibilities of substituting manganese for the molybdenum and nickel in the usual airplane structural steels containing 0.4 per cent C, 0.9 Cr., 0.15 Mo; or 0.35 per cent C, 2.12 Cr, 2.1 Ni and 0.3 Mo, also have been treated in detail elsewhere. For instance, H. Cornelius tried compositions[3] (a) 0.35 per cent C, 0.3 Si; 1 to 1.7 Mn, 0 or 0.3 Cr, 0 to 0.2 Mo, 0 to 0.3 V. (b) 0.27 to 0.41 per cent C, 0.3 to 0.5 per cent Si, 1.4 to 2.1 Mn, 0.6 to 1.9 Cr, 0 or 0.6 Ni, 0 or 0.2 Mo, 0 to 0.35 V. They were melted in a 16-lb induction furnace and test samples forged to ¾-in. diameter. The structure, sensitivity to overheating, hardenability in air, tensile properties after heat treatment and temper brittleness were determined.

In steels with over 1 per cent Mn, a small V addition reduced the sensitivity to overheating. The low-alloy steels containing manganese, when heat treated to the usual tensile properties, had higher yield strength than comparable chromium-molybdenum steels. In the more highly alloyed steels the addition of vanadium to the manganese steels gave higher yield strengths.

Steels without molybdenum gave lower impact values. Temper brittleness was also diminished by vanadium. It was concluded that manganese steels could successfully be substituted for the chromium-molybdenum steels. Whether they could be substituted for the chromium-nickel-molybdenum steels was not certain.

M. P. Brown, of the Stalingrad Tractor Plant, early in the year presented a report on heat resisting steels using no nickel.

From these studies were based the following conclusions:

Chromium-silicon steels with the addition of 2 per cent aluminum and about the same amount of either molybdenum or copper may be selected for services requiring extremely high heat resistance. These steels are also reasonably strong and very stable up to 1650 deg. F., and at higher temperatures are inferior only to 18 per cent Cr, 25 per cent Ni steel. They are, therefore, very useful for many furnace fittings, plates, bars and other details working at high temperatures but under moderate load. (They can even carry good loads up to 1650 deg. F.) For steels operating under heavy load at higher temperatures, the high chromium and high chromium-manganese steels were used.

Also, from the same Stalingrad plant came an interesting report on manganese-silicon steels for transmission gears. Various experiments showed that forged and heat treated low chromium-manganese and chromium-manganese-silicon-copper steels can be substituted even for the higher chromium-nickel steels of the S.A.E. 3300 series for transmission gears and other important machine parts. Forging and rolling are done without difficulty; however the steels containing copper are subject to surface cracking if overheated slightly. Normal quenching, carburizing and other heat treatments proceed normally without tendency to cracking or increased warping.

The effects of titanium on low carbon 1 per cent chromium steel were reported by John N. Pappas and Morris Cohen.[4] The effect of titanium on the mechanical properties of a 1 per cent Cr steel with 0.20 per cent C was studied. The steels were prepared in a 17-lb. induction furnace.

The following conclusions were drawn: The addition of aluminum, titanium or vanadium to a 1 per cent Cr steel with 0.20 per cent C raises its coarsening temperature. The effectiveness of the elements decreases in the order named. The addition of titanium to the above low-carbon 1 per cent Cr steel lowers strength and raises ductility and impact value. Titanium not only deoxidizes and refines the grain, but has specific alloying action as well.

Aluminum and titanium inhibit air hardening after normalizing up to 1850 deg. F. After normalizing at 2050 deg. F. the air hardenability of titanium-bearing steels increases. Vanadium in the absence of aluminum or titanium raises air hardenability after normalizing at 1850 deg. F. or above.

In "pseudo-carburized," heat-treated, quenched-and-tempered steels, titanium contents between 0.025 and 0.25 per cent produce a wide range of mechanical properties. Low-titanium steels exhibit high strength with moderate duc-

tility and impact resistance, while higher titanium steels exhibit moderate strength with high ductility and impact resistance.

The combined use of aluminum and titanium may be advantageous in obtaining certain properties with less titanium than would be required in the absence of aluminum. Hardened vanadium-bearing steels show greater ability to retain their strength after tempering than non-vanadium steels. This property is not impaired by reducing the vanadium from 0.16 to 0.09 per cent and in replacing it with about 0.03 per cent Ti. This gives an excellent balance of properties.

Vanadium steels have also been studied in great detail by German aeronautical research bodies with a view to their substitution in aircraft for the molybdenum steels. *Stahl und Eisen*[5] reports experimental work in search for a steel which, in the form of thin sheets and tubes, can be satisfactorily welded and after heat treatment has a tensile value of a minimum of 128,130 lb. per sq. in. and a yield point of at least 102,370 lb. per sq. in.

High frequency products were prepared containing 0.25 to 0.30 per cent C, 0.3 to 0.8 per cent Si, 0.5 to 1.6 per cent Mn and 0.25 to 0.6 per cent V, and some with 0.5 to 1 per cent Cr. Of the steels investigated, those with satisfactory mechanical properties after welding with or without heat treatment were a 0.25 per cent C, 0.3 per cent Si, 0.6 per cent Mn, 1 per cent Cr and 0.25 per cent V steel; and one with 0.3 per cent C, 0.4 per cent Si, 1.2 per cent Mn, 0.6 per cent Cr and 0.25 per cent V. A suitable substitute chosen for the 0.25 per cent C, 1 per cent Cr and 0.20 per cent Mo steel, which is in extensive use, is a steel with 0.24 to 0.30 per cent C, 1.0 to 1.3 per cent Mn, 0.6 to 0.9 per cent Cr and 0.1 to 0.2 per cent V, of which trial melts gave satisfactory results.

In the tool steel field, Bethlehem announced a special high-carbon, high-vanadium tool steel said to be suitable for a wide variety of uses ranging from heavy hogging cuts to fine finishing operations. This steel represents a departure from standard practice in that the carbon content has been substantially increased to give extra hardness, and the average values obtained after heat treatment are 65 to 68 Rockwell C. This extra hardness has been obtained without sacrifice of toughness, and the mechanical properties are approximately the same as those of the standard 18 : 4 : 1 high speed steel. The shock-resisting properties make it possible to use this steel on intermittent cuts without breaking the tool. Owing to the high carbon content it also lends itself to fine finishing operations, producing a surface comparable with that obtainable with the old type finishing steel that can only be run at a low speed. Good red hardness also makes it suitable for heavy cuts. The composition of the new steel is approximately tungsten 18, chromium 4, vanadium 2.5, molybdenum 0.6 to 0.8, and carbon 1.0 per cent. Standard heat treatment without extra precautions is used. The principal applications include machining, both roughing and finishing cuts, for all general purposes, such as heat-treated railway car wheels and axles, cast iron and heat-treated alloy steels.

In the heat treating field, considerable interest has been evidenced in the use of the metallizing gun for spraying copper onto steel to prevent carburization or decarburization. L. F. Train, of Pratt & Whitney of Canada, has stated that his company has sprayed copper on S.A.E. 4615 parts and carburized them in the pack. It was found that such a coating was only 80 per cent effective. The reason is evidently that the coating is slightly porous and hard to apply evenly when parts have sharp corners and recesses.

In the case of "Moly" high speed steel hardened from 2200 deg. F., copper, melting at 1981 deg. F., could conceivably be used to "wet out" and protect the tools from decarburization, but the tools would have to be ground all over afterwards to get rid of the copper. W. C. Reid, of Metallizing Engineering Co., reported that the metallizing gun has been frequently used to mask parts that must be soft after case-hardening. In practice the parts are roughened by blasting and the portions to be hardened are covered with masking tape, allowing ⅛ in. around edges which are to remain soft. The bare portions are then sprayed with copper 0.010 in. thick, and the masking tape removed. Frequently a fairly sharp transition occurs from soft to hard areas, the Rockwell readings often increasing 30 to 40 points in a distance of 1/16 to ⅛ in.

Also an interesting electric salt bath process known as simultaneous brazing and carburizing was developed by Ajax during 1941. Its application to the brazing of caps to chemical shells has been announced, with production-scale installations, already on the drafting boards, worked up from existing batch-type (or manual) furnaces now being utilized.

Non-Ferrous Research Active

A subject of constant interest is porosity, particularly in the light metals. The characteristics peculiar to light alloys, indices of porosity trouble, influence of alloy composition, melting practice, temperature and time factors in melting, removal of gases from the melt, porosity in pressure die-castings, sand molds, design of permanent molds, dies for pressure die-casting, etc., were discussed in an interesting article during the year.[6]

The greater part of the porosity encountered in defective castings is due to gas—principally to hydrogen absorbed as such, and to hydrogen generated from steam decomposed by molten aluminum. On these grounds reverberatory furnaces cannot be recommended for the melting of aluminum for casting purposes. Where pot furnaces are used, the design should be such that combustion gases cannot reach the surface of the melt by passing above the rim of the crucible.

Irrespective of the melting system employed, three factors must be borne in mind when melting metal for sand and permanent mold castings. First, the charge should be run down at a reasonably rapid rate to avoid, in the heated (but solid) state, undue exposure and possible contamination. Second, it should be heated only to that temperature above its melting point which experience has shown to be essential to attain ideal pouring conditions for the prevailing section of the casting, or for the particular size of casting under production. Finally, with the melt up to required temperature, it should not be allowed to "stew" for any longer period than necessary.

An average pouring temperature for all aluminum alloys may be taken to be about 1300 deg. F. An upper limit of 1435 deg. F. has been quoted for thin-walled castings to be produced in certain of the more difficult alloys, while 1250 deg. F. has long been given as the lowest permissible figure, this being applicable to castings of the largest size. Eutectic silicon alloys, which are

ONLY the best for battleship turrets. These Bethlehem workers are flame gouging surface defects from heavy armor plate forgings. The plate is later reforged to exact size. Ritchie photo.

"modified" with sodium or sodium salts, must be heated to about 1375 deg. F. before pouring.

The degassing of virgin aluminum alloy melts by the use of chlorine, or certain volatile inorganic halogen salts, finds little application in normal foundry work; this practice is adopted as a rule, only for such special cases as the production of certain types of cast rolling slabs or extrusion billets.

Vanadium additions to aluminum-magnesium-zinc alloys were the subject of an interesting original research reported on during the year. The experiments of Bungardt and Schaitberger were aimed at the development of a precipitation-hardening, commercial aluminum-zinc-magnesium wrought alloy of higher strength, better corrosion resistance, and stress-corrosion immunity after water quenching from 850 deg. F. and room temperature aging, and led to an aluminum alloy containing 4.5 per cent Zn, 3.5 Mg, 0.3 Mn, 0.3 Fe, 0.2 Si and additions of vanadium and copper.

More uniform shop results are obtained with water quenched than with air-cooled alloys. Thus, preliminary tests restricted the maximum zinc content to 5 per cent. As the alloy should lend itself to forging and extrusion, the maximum manganese content had to be lowered to 0.4 to 0.5 per cent. The iron and silicon content should permit the use of commercial aluminum of 99.5 per cent purity.

The effect of small additions of vanadium and copper was studied most thoroughly in regard to strength and ductility, stress-corrosion and general corrosion resistance in relation to different heat treatments (water *vs.* air quench). Vanadium additions as low as 0.05 per cent refine the grain appreciably, but vanadium aluminide crystals appear near 0.25 per cent V.

A series of aluminum alloys with constant zinc, magnesium, manganese, silicon and iron contents and with vanadium and copper contents varying from 0.05 to 0.25 and from 0.01 to 0.76, respectively, show that the precipitation hardening effects and elongation values drop considerably on changing from water quenching to air cooling from 850 deg. F.

By raising vanadium from 0.05 to 0.1 per cent, a considerable gain of strength is obtained. Elongation drops slightly and tensile strength and yield point increase notably on increasing the copper from 0.1 to 0.65 per cent.

The stress-corrosion resistance was tested in 3 per cent NaCl solution using 10 per cent cold rolled looped strip samples. A marked improvement is obtained by adding 0.1 per cent V, but higher concentrations have no further beneficial effect on the stress corrosion resistance. Complete immunity against this defect is secured by adding 0.1 V + 0.1 Cu.

The tendency of water-quenched, age-hardened aluminum-zinc-magnesium alloys to stress-corrosion breakdown can thus be

banished by small additions of vanadium + copper. The general corrosion resistance was tested progressively during a 28-day period by loss of strength and ductility. Rising vanadium additions lower the corrosion resistance of both water-quenched and air-cooled alloys but this impairment shows up only *above* 0.1 V. Even at that, the vanadium-containing alloys are better than the presently used, not-cladded aluminum-copper-magnesium alloys.

Copper has no effect up to 0.3 per cent, but the general corrosion stability falls off with time, due to pitting, above 0.3 Cu.

An aluminum alloy for use in a mechanically worked state which, after suitable heat treatment, will combine high tensile strength and good resistance to corrosion, was described during the year in the British Patent No. 534,623. The alloy has the following composition: copper, 3.8 to 4.3 per cent; magnesium, 1.2 to 1.7 per cent; one or more of the elements, tin, antimony, cadmium, 0.1 to 0.5 per cent in all; iron, not more than 0.4 per cent; silicon, not more than 0.4 per cent; and aluminum, remainder. After mechanical working, the alloy is preferably solution treated, quenched, and aged naturally. Suitable solution temperature is 500 to 510 deg. C., and after quenching from this temperature in cold water, the alloy is naturally aged for five days.

A careful experimental study of the causes of porosity in tin-bronzes was made during the year by T. F. Pearson and W. A. Baker, working in the laboratories of the British Non-Ferrous Metals Research Association.[8] The alloys studied were straight 90:10 copper-tin bronzes and 89.5:10, 0.5 phosphor-bronzes, and these were melted by high-frequency heating in a special apparatus in which the atmosphere during casting and pouring could be controlled.

The results demonstrate very clearly that shrinkage unsoundness, generally in the very harmful form of interdendritic fissures, is as important a cause of porosity as gas unsoundness. Shrinkage unsoundness results from the long freezing ranges in the alloys and can only be eliminated by strongly directional solidification, such as is produced by slow top-pouring in chill molds. It is almost inevitable in sand castings. Gas unsoundness may be caused to some extent by the evolution of carbon monoxide and sulphur dioxide during solidifications, but hydrogen is probably the most serious cause of trouble.

Small amounts of hydrogen may certainly improve the properties of chill castings, probably by distributing the porosity evenly; but in sand castings even small amounts have a very deleterious effect, and in both sand and chill castings large amounts of hydrogen produce gross unsoundness. Another cause of unsoundness is the evolution of steam formed at the moment of solidification by the recombination of dissolved hydrogen and dissolved oxygen. This may be largely eliminated by oxidation to remove the hydrogen or deoxidation to convert the oxygen to an inert oxide. The generally accepted practice of melting under oxidizing conditions and deoxidizing before pouring is thus based on a sound principle; but it is not likely to be completely effective when elements having a high affinity for oxygen are present in the molten alloy.

The influence of aluminum on the microstructure and tensile properties of copper alloys containing manganese is given in the form of a scale and has been given in a report dealing with the solidification of aluminum bronze.[9] At one end of this scale is the alpha range, containing less than 7.5 per cent Al and at the other the beta range, containing over 11 per cent Al. Between these extremities, there is the duplex range of aluminum bronze alloys.

Another chart shows the influence of solidification speed on the microstructure and tensile properties of a typical alloy (in the duplex range) containing 9.7 per cent Al; 3.0 Mn; 3.0 Fe; and 3.0 Ni, cast in a sand mold, in thickness varying from 6 in. to 3/16 in. It is shown that as the grain size decreases the mechanical properties increase in value.

Copper-aluminum alloys pass almost instantaneously from the liquid to the solid state, and in doing so the metal is reduced to nine-tenths of its liquid volume before the commencement of ordinary linear contraction. Adequate feeding is therefore imperative.

In profiled castings various influences have their effect on shrinkage: (1) Slow pouring allows the metal to solidify and to start shrinking while the mold is actually being filled, thus reducing the amount of shrinkage in the finished casting. (2) The extreme plasticity of these alloys just below their melting point allows them to "give" when resistance is encountered from a core or projection on the mold; this in turn results in reduced shrinkage in the casting. Also (3) the relatively high tensile strength of the metal at temperatures below 1300 deg. F. enables it to crush the sand in the hardest mold. This tends to increase shrinkage of the finished casting. In general shrinkage increases with an increase of thickness of casting.

The effects of adding nickel, iron, manganese, zinc, cadmium, cobalt, chromium, antimony, titanium and tungsten on the mechanical properties and corrosion-resistance of 2-phase aluminum bronzes also were reported on by Koiso, Kusumoto and Yata.[10]

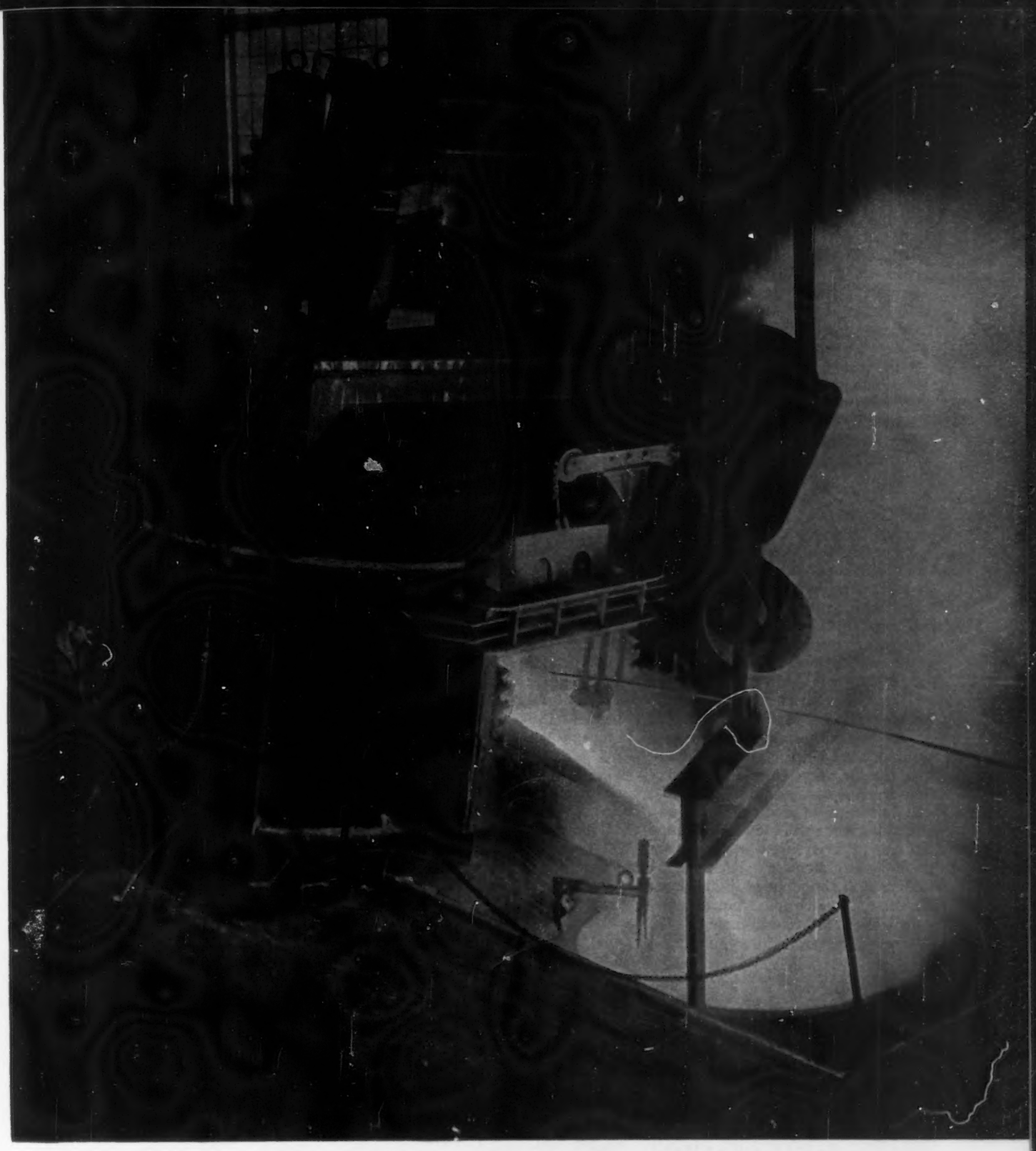
Nickel in excess of 2 per cent raised the proof stress and hardness, but decreased the ductility, and had an almost negligible effect on corrosion resistance.

A new bronze, called HB-5, was developed, containing 10.5 per cent Al, 4 Fe, 4 Mn, 1 max. Zn, 0.5 max. Cr, and remainder copper. Its specific gravity is 7.28; thermal expansion coefficient (20 to 200 deg. C.) 1.91 x 10^{-5}; electrical conductivity 5.5 per cent of standard copper; and Young's modulus 16,000,000 lbs. per sq. in.

The mechanical properties of complex aluminum bronzes of approximately eutectoid composition vary greatly with minor variations in the aluminum content, rate of cooling, mass of specimen, etc.

In a Russian study of aluminum cast irons for high temperature service,[11] aluminum alloy irons were prepared, using a standard base iron, to give aluminum contents up to 24 per cent Al. The carbon content decreased with increasing aluminum percentage, and the drop was particularly sharp when the aluminum content was increased from 16 to 18 per cent. For specimens containing 15 per cent or more aluminum, the sulphur was decreased to 0.01 to 0.02 per cent.

Specimens of ordinary gray iron were not heat-resistant at 1500 to 1600 deg. F. Those containing up to 5 per cent Al showed an increased resistance against oxidizing gases but they could not be considered sufficiently heat-resistant from other viewpoints. Specimens containing 5 to 12 per cent Al were sufficiently heat-resistant while those of over 12 per cent Al were



THE heart of the victory program is electric furnace steel. This is the 15-ton No. 5 furnace at Rustless Iron & Steel Corp., one of many units turning out the thousands of tons of stainless and alloy steels required for aircraft, naval and armament use.

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highly heat-resistant. With sufficient aluminum content, the addition of silicon had little effect on the heat resistance.

Resistance to bending decreased gradually up to 13 to 14 per cent Al and increased gradually with further addition of aluminum. The room-temperature hardness increased smoothly up to 8 per cent Al; for 8 to 18 per cent Al it changed sharply with a maximum at 12 to 13 per cent Al; and for over 18 per cent Al, the hardness decreased smoothly.

Specimens containing 8 to 18 per cent Al had the most satisfactory mechanical properties at high temperatures (up to 1650 deg. F.). For up to 8 per cent Al, the maximum resistance to bending was at 750 deg. to 950 deg F. with a sharp drop at 1300 deg. F. With over 18 per cent Al the resistance to bending decreased smoothly with increasing temperature. Small additions of chromium and nickel had no substantial effect.

Specimens containing 20 to 24 per cent Al are considered best from the point of view of general scaling-resistance and mechanical properties at high temperatures. Investigations aiming at the development of a wrought aluminum-magnesium alloy suitable for pistons and possessing high strength and hardness at elevated temperatures, together with favorable thermal conductivity, were reported on by Meyer-Rassler.[12]

Although a number of light alloys for piston application are available, none meets all requirements. To save weight by alloying aluminum with magnesium has been only partly successful as magnesium content exceeding 12 per cent renders the alloy brittle, and additional alloying elements bring the aluminum-magnesium alloy into the "weight-class" of aluminum-silicon piston alloys.

Thermal expansion and thermal conductivity properties are not satisfactory yet but bending fatigue strength is good. The running properties could be further improved, but at the expense of strength.

The hardness and tensile strength of aluminum-magnesium alloys are inferior to age-hardened aluminum-silicon piston alloys at room temperatures and up to 400 deg. F., but superior above the latter temperature. Further improvements should aim at a more favorable strength at elevated temperatures without impairing the other favorable physical properties already secured.

Investigations of the mechanical properties of aluminum-zinc-magnesium alloys were reported on by Hansen, Muhlenbruch and Seemann.[13] Although aluminum-zinc-magnesium alloys can be age-hardened at both low and moderately high temperatures to develop considerable mechanical strength they have not been extensively used, owing to their tendency to stress corrosion. This tendency however, can be eliminated by suitable special heat treatment. Thirty-three alloys were investigated, with compositions of 0.97 to 6.2 per cent Mg, 2.25 to 6.95 per cent Zn, 0.25 to 1.02 Mn, 0.17 to 0.34 Fe and 0.11 to 0.84 Si.

The mechanical properties of cold-precipitation-hardened aluminum-zinc-magnesium alloys with up to 7 per cent Zn and up to 6 per cent Mg are practically independent of the solution temperature (investigated range: 715 to 970 deg. F.). Time periods at solution temperature of 20 min. (in salt baths) are quite sufficient. In some cold-aged alloys the optimum of properties is not reached even after 90 days at cold storage. In certain cases, air-cooling after solution annealing reduces the strength, but this can be counteracted by a cold-deformation, *e.g.* of 5 per cent.

Alloys of about 55,000 lb. per sq. in. tensile strength, 35,000 lb. per sq. in. elastic limit and 15 per cent elongation that are resistant to stress corrosion can be produced by two principal compositions: (1) An alloy with about 2 per cent Mg and 6 per cent Zn in the air-cooled, cold-precipitation-hardened state; (2) another with about 2 per cent Mg and 4 per cent Zn treated by quenching in water from the solution temperature and subsequently precipitation-hardening at 175 to 210 deg. F. The optimum manganese content is about 0.5 to 0.8 per cent, and silicon should not exceed 0.5 per cent.

One of the principal uses of strontium and its salts is in the metallurgical industry, according to Dr. M. S. Krishnan, of the Geological Survey of India, in Bulletin No. 3, Strontium Minerals, issued by the Survey. Small amounts of strontium added to copper act as a deoxidizer and purifier. The metal also prevents the formation of blow holes in copper used for castings. Tin-strontium and lead-strontium alloy, containing 5 per cent Sr and the rest tin or lead, is used as a cleanser in certain alloys like those of copper, tin, lead and zinc. Small amounts of Sr and Sn are said to impart hardness and durability to the lead used in making storage batteries.

Strontium carbonate has been used in the steel industry. Added to the open-hearth charge, it acts as a flux and increases the fluidity of the slag at the same time reinforcing its basic character. It also removes excess sulphur and phosphorus in steel. It is used in Germany to produce special high-grade alloy steels. Extensive use of this material is prevented by the high cost of strontianite in comparison with lime (or alkali carbonate) which is commonly used for these purposes, but is not so efficient. In German practice, about 1 to 1½ per cent by weight of strontianite is added to the furnace charge as soon as the charge melts. It has been suggested that very high grade steel, containing only very small amounts of sulphur and phosphorus, can be produced in the open hearth or electric furnace by using strontianite, even if the pig iron or scrap contains large amounts of these impurities.

The properties of certain lead-bearing alloys were described by Phillips, Smith and Beck.[14] A new lead-base bearing alloy containing about 12.5 Sb, 3.0 As and 0.75 Sn was considered, and its properties compared with those of conventional lead-base and tin-base alloys.

At elevated temperatures, approximating those prevailing in automotive engine bearings, the tensile strength and Brinell hardness of the new alloy are considerably higher than those of the standard lead-base alloy and equal to those of the tin-base alloy. In addition, it retains its higher hardness over long periods of exposure to elevated temperatures, whereas the standard alloys show considerable softening under such conditions.

The rotating-beam fatigue strength and the flexure fatigue strength of the new alloy at room temperature are superior to those of the standard bearing alloys. This superiority is also fully retained at 200 deg. F.

The alloy is easy to cast, retains its composition after repeated remelting, and shows relatively little loss of weight due to drossing. Above 350 deg. F., the alloy is ductile enough to permit shaping as re-

quired in certain bearing manufacturing processes.

The properties of the new alloy indicate that it is superior to the lead-base and tin-base bearing alloys now in general use. There have been several installations of the alloy in automobiles and machinery and no failures have been experienced to date, even after 18 months' service in some cases.

Since tin is a strategic material, the new alloy promises to be of great interest because its use can decrease the amount of tin employed for bearing purposes.

Attaining greater prominence during the year was an interesting adaptation of a centrifugal process for the manufacture of jewelry parts and novelty items, described by Alrose Chemical Co. These parts are cast of a low melting point alloy of tin directly in rubber molds, the rubber being of such composition as to resist successfully the molten alloy for a large number of casts.

The mold is produced by placing models of a suitable material between two ungalvanized disks of solid compound. The assembled unit is placed in a simple vulcanizing press whose platens have been previously heated to the required temperature, and pressure up to 36,000 lb. exerted. After curing for approximately 45 min., the pressure is released, the mold removed and split.

Such rubber molds are said to cost less than 10 per cent the cost of bronze molds previously used. They are suitable for casting metals having a melting point up to 700 deg. F. on a production basis. From 15 to 100 gross of castings can be produced from a mold costing less than $5. The resulting castings retain fine detail, have smooth texture and are free from blow-holes. Casting is done in a centrifugal machine operating at 3600 ft. per min. at the outside circumference of the mold. The molds are merely clamped together and a ladle of metal poured into the central cavity, the molds opened and the castings separated from the gates.

Many Plating Developments

With so many metals so strictly rationed now, there has been a great deal of attention paid to methods of plating metals onto nonmetals, as a means of conserving material. A particularly searching inquiry into this technique has been made by Adolph Bregman.[15] Today the largest single use of "electroplasty" is electrotyping, and the list of products so electroplated is almost endless. The methods in use include: (1) Binder and conducting coat combination; (2) sprayed metal; (3) cathode sputtering; (4) evaporated metal or vacuum deposition, and (5) silvering by chemical reduction or precipitation.

The binder and conducting coat combination is the most generally used for it is flexible and applicable to a wide variety of products. In some forms it has certain disadvantages; its deposit is not uniform and has a tendency toward "orange-peeling." A silver conducting coat eliminates some of these disadvantages but it is fragile.

Metal spraying is a simple process, calling for cleaning of work, roughening the surface and application of molten metal, fed in wire form to a heated air gun. This method is generally applicable to structural installations, but it can also be used for small work where the granular effect of the metal surface is not objectionable.

Cathode sputtering is expensive but a very fine process. The porosity of the deposit decreases with the thickness of coating. This process is used for preparing fine mirrors, metallizing fabrics, etc.

The process of coating a nonmetal with a metal by electrolysis calls for the application of a bonding coat, the application of an electrically conductive film, and electrodeposition to the desired thickness, after which any other finish may be applied. Porous articles are treated to make the surface proof against liquid penetration. In all cases where adherence is important, either shellac or lacquer is used. If bronze powder is applied by brush, it should be preceded by a coat of boiling linseed oil.

The conducting films applied may be of graphite, bronze powder, silver or silver nitrate. Graphite is used for coating wax. The most commonly used material for sensitizing the general run of metallized articles is composed of: 1 fluid oz. nitrocellulose lacquer; 3 to 7 fluid oz. lacquer thinner; and 2 fluid oz. copper bronze or lining powder.

Sometimes it is best to apply a silver deposit to bronzed work before copper plating. The silver may be applied by pouring the solution over the work. Silver sulphide is often used as a conductive coating over shellac.

Finely detailed decorations are difficult to coat with bronze powder or graphite. In such cases sensitizing with a film of silver similar to that used for mirrors may be used. Bakelite may be sensitized by dipping in a silvering solution; the formaldehyde in the bakelite takes the place of a reducer.

In the treatment of plastics in general, the operation is begun with two bonding coats, drying after each coat. Parts may be painted or sprayed with bronze powder mixture. Smooth plastic surfaces may be roughened before silver-coating.

One recent process includes the following operations: (1) The plastic is cleaned in mild alkali; (2) rinsed and dipped in dilute acid, and rinsed; (3) soaked in tin chloride solution and rinsed; (4) a conducting and bonding metal coat is applied consisting mostly of silver, and (5) the work is rinsed and plated in acid copper solution.

Plating onto aluminum is always of interest, and a report early in the year by Beerwald[16] describes hard-chromium plating on aluminum. The adhesion of electroplated coatings on aluminum depends largely on having the aluminum surface free of oxide and somewhat rough. These factors must especially be observed when producing hard-chromium films on aluminum-copper-magnesium alloys.

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The denser and more uniform the roughening of the surface, the better is the adhesion. Best results in this direction were obtained by first degreasing in hot caustic soda, rinsing, cleaning in nitric acid, rinsing and then pickling in a saturated solution of crystallized nickel chloride with an additon of 2 per cent HF and 4 per cent boric acid.

For aluminum-magnesium alloys, however, the most suitable pickling bath is a 15 per cent copper chloride solution with an addition of 0.5 per cent hydrochloric acid; the pretreatment is the same as above. The attack of the pickler increases with the magnesium content of the alloy; the pickling time therefore varies from 30 sec. for 9 per cent Mg alloy to 1½ min. for pure aluminum.

The chromium film so obtained did not come off even when subjected to very sudden temperature changes. The chromium hardness on aluminum, measured with the Zeiss microhardness tester was 1190, while on steel it was 1280.

The hard-chromium plating bath recommended for this purpose contains 320 gm. per liter CrO_3 and H_2SO_4 in amounts equal to 1.2 per cent of the CrO_3 content. The thickness of the chromium layer is about 0.0007 in. after 1 hr. at a current density of 50 amp. per sq. dm. and 120 deg. F. Recently baths with only 240 gm. per liter CrO_3 have been shown to give better current efficiency; they can be used for light metals as well provided they contain H_2SO_4 and no other acids. It was found that HF-containing baths were unsuitable for chromium-plating on aluminum except with extremely high current densities.

The electroplating of alumninum on steel also has recently received a great deal of attention, and an excellent report on this technique appeared at mid-year.[17] If the process were commercially feasible, the electroplating of aluminum on iron and steel would offer decided advantages over hot dipping methods or methods involving heat and pressure. One important advantage would be the minimizing or complete avoidance of the formation of the brittle alloy layers between the coating and basis metal. Another advantage would be the possibility of offering protection to finished products.

Aluminum has been deposited from aqueous solutions, but the process is fraught with such difficulties that apparently the best hope for the electroplating of metals with aluminum lies in the use of other plating media. Various non-aqueous solutions such as aluminum nitrate in liquid ammonia, aluminum sulphate in fuming sulphuric acid, and others have been investigated, but the chief difficulty is the same as that experienced with aqueous solutions, *i. e.*, reaction of the nascent aluminum with the solvent.

Organic solvents might be expected to yield more satisfactory results, but even in this case there is danger of the aluminum reacting with the electrolyte. It should be remembered that in the electro-deposition of aluminum, the protective oxide film is not present on the aluminum surface, hence the aluminum is highly reactive. For example, 0.01 per cent water in ethyl alcohol will vigorously attack a clean aluminum surface. While aluminum can be deposited from a solution of aluminum bromide in ethyl bromide, rapid solution of the aluminum occurs. The behavior with a solution of aluminum iodide or bromide in pyridine is similar.

Attempts to deposit aluminum from halides in polar organic compounds have been unsuccessful. However, insufficient work has been done to prove the use of such compounds unfeasible. Considerable work has been done using alumino-organic compounds of the Grignard or Friedel-Crafts type. A mixture of aluminum ethyl and diethyl iodides dissolved in dry ether yielded an electroplate, using a current density of 0.02 amp. per sq. cm. at 40 volts. However, solutions containing a Friedel-Crafts type of aluminum organic complex have proved more successful.

One typical solution of this nature was made up of 20 gm. $AlCl_3$, 20 gm. $AlBr_3$ and 40 cc. ethyl bromide in 120 cc. of a mixture of xylene and benzene. Current density was 1.55 amp. per sq. dm. at 20 deg. C. The solution which gave optimum results contained 20 gm. each of $AlCl_3$ and $AlBr_3$, 4 gm. Al dissolved in a mixture of 80 cc. benzene, 40 cc. xylene and 40 cc. ethyl bromide. The cathode efficiency was above 75 per cent and the anode efficiency was above 100 per cent. The corrosion protection of the aluminum deposits on steel was equal to an equivalent weight of zinc, and the coating could be anodized and dyed, indicating good uniformity.

The bath prepared as indicated above separates into two layers; the upper one, consisting mostly of benzene and xylene, acts as a protective medium and keeps out air and moisture. The vessel is covered with a tight-fitting lid to keep out moisture, and a tube is provided to allow for the escape of gases. The electrolyte must be maintained between 20 deg. and 25 deg. C. The current density varies from 10 to 20 amp. per sq. ft., the higher density being suitable for use with water-cooled anodes.

Precautions must be taken to prevent the inflammable electrolyte from catching fire and to prevent electrolysis of the upper layer. The vent should incorporate a method of recovering bromine.

Although much work has been done in investigating fused salt baths for electro-deposition, the results have not been particularly gratifying. The choice of suitable salts is naturally very limited; for example, the temperature must be kept below the melting point of aluminum. It has been found very difficult to control the variables and hence insure reproducible conditions.

A molten mixture (1:1) of aluminum chloride and sodium chloride has been used as an electrolyte with generally unsatisfactory results. The deposits were often dark, coarse-grained and non-adherent. Other mixtures of the same two salts were used with varying success.

In one case, a reasonably good deposit was obtained, but the composition of the bath changed in a very short time and yielded poor deposits. A current density of 0.2 to 0.4 amp. per sq. dm. was used at a temperature of 125 deg. to 130 deg. C. The bath was tolerant of aluminum oxide, 1 per cent Al_2O_3 having no appreciable effect on the electrolysis when using 2 $AlCl_3$: 1 NaCl.

The structure of the deposit seemed to depend mainly on the current density, the concentration of the aluminum chloride and the duration of the electrolysis. Temperature seems to have little effect, and the coating thickness (0.0005 to 0.0001 mm.) is independent of the duration of the plating.

Some platings, quite resistant to corrosion, were made from 3:1 and 2:1 molar proportions of $AlCl_3$-NaCl The high corrosion resistance can probably be ascribed to the extreme purity of the deposited metal, a feature of the electrolytic methods in general. Satisfactory coatings 0.08 mm. thick were obtained with

(CONTINUED ON PAGE 186)

MOLTEN *aluminum for steel aircraft cylinders. The thin, deep fins present a corrosion problem, effectively solved at Wright Aeronautical Corp. by employing a Metallizing Engineering Co. gun to get an aluminum spray into each fin. Ritchie photo.*

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Non-Fe

A STUDY of the non-ferrous metals industries during the past 12 months is interesting inasmuch as the industries have met the military and essential civilian requirements by stepping up production and imports to such a point that these demands were currently met, and there was still sufficient metal to handle a fair portion of the non-essential civilian needs. How long this latter condition will continue to exist is problematical, but with the United States entering the war it is safe to state that industries not on war-production will get metals only for as long as it takes OPM and other government agencies to organize the consumption and direct the entire flow into war industries.

As to the estimated production of the various non-ferrous industries for the coming year, they will be dealt with by commodity. However, the estimates are based entirely on current rates of production, and when the full-time, three shifts a day, seven-day-week production schedules suggested by the industry, labor unions and the government get under way, these estimates will be very low. At present, most of the mines and refineries are working on a 40-hr. week basis, and if a 168-hr. week schedule is inaugurated, production may be stepped up as much as three times that estimated.

Demands, now that the United States is in the war, will likewise be stepped up considerably, possibly in greater proportion than the increase in production.

Copper

COPPER production went into high gear during the first months of the war in Europe, in late 1939, and reached an all-time monthly production peak in March, 1941, when 95,332 tons of refined copper were produced. Since that time, monthly production has declined slightly, but has managed to remain above the 80,000 ton a month mark.

The total production of refined copper from crude sources during 1941 amounted to about 1,061,000 tons. Imports of 250,000 tons by commercial organizations and imports of 350,000 tons of government owned refined metal bring the total available supply of refined metal to about 1,661,000 tons. The metal imported by the government is held by Metals Reserve Corp., as stockpile material, and does not include bonded copper or copper imported for lend-lease. Defense needs for 1941 were estimated at 600,000 tons and the aggregate demand from all sources was set at 1,750,000 tons, leaving a deficit close to 100,000 tons.

Government Orders:

After adhering to a suggested price ceiling of 12c. a lb. for electrolytic copper, delivered Connecticut Valley, for many months, an official mandatory price ceiling was established in August. This ceiling froze the price at the same level as had prevailed. Also in August, OPM placed copper under a strict allocation basis, after being under priority control during the period from May 31 to August. In October, OPM deemed it advisable, in trying to make copper supplies reach all defense industries, to restrict the use of copper to such an exent that only defense industries could get needed supplies. A restriction order on the use of the red metal in the manufacture of more than 100 civilian commodities and by construction industries was issued. However, in November, this order was modified to some extent, when OPM permitted a "Special Appeal Form" to be used by manufacturers of some consumer goods to get badly needed supplies, particularly if restriction of copper supplies threatened to close their plants.

Marketwise, copper has been one of the most stable of the non-ferrous metals, holding very close to the price agreements and price schedules. Late in the year, OPA permitted specified Michigan producers that were faced with high operating costs to charge prices in excess of the 12c. a lb. ceiling, but this deviation from the schedule was made only to increase copper supplies. Further price increases are likely for marginal producers to augment normal production, OPA recently advised.

As to the supply outlook for 1942, the United States is expected to have close to 1,750,000 tons, 1,100,000 tons of which will be produced domestically, and the remainder will be imported. Of the domestic production, 100,000 tons will be recovered from scrap. This 1942

Non-Ferrous Metals AT WAR

T. E. LLOYD
Associate Editor, The Iron Age

Producers of non-ferrous metals met the "all-out for national defense" appeal with greatly increased production, and plan still further resource development to accommodate a rush of new war demands.

supply is expected to be 70 per cent of the 2,500,000 tons of new copper produced by the United States and the British Empire combined, and some imports from South America. Compared with known production of copper by Germany and Nazi-held countries, the amount available to the United States alone will exceed Germany's estimated supply of 125,000 tons by 1,525,000 tons.

Consumption:

From the standpoint of consumption in 1942, indications are that nearly 1,850,000 tons of copper will be required. For brass shell cases alone, 900,000 tons will be needed, and the Navy estimates of requirements are 100,000 tons for special naval purposes and another 150,000 tons for degaussing (making ships invulnerable to magnetic mines). Exports of refined copper to Great Britain are set at 200,000 tons; electrical requirements at 200,000 tons; and indirect electrical requirements have been set at 300,000 tons. Thus, supplies in addition of those available from American and British owned mines will be necessary to meet even the direct defense requirements. Furthermore, about 250,000 tons will be needed for essential civilian requirements, plus a desirable 400,000 tons for non-essential needs. Some of this needed copper supply will be available from South America.

To expedite the production of crude and refined copper in South America, OPM granted priorities on machinery and supplies to specified South American copper producers. From these sources, it is expected that both crude and refined metal will be forthcoming for domestic refining and for the MRC stockpile. How much metal will supplement the estimated available supply of 1,750,000 tons is hard to determine, but it is believed that for MRC alone, the 350,000 tons purchased this year will be exceeded by at least 200,000 tons.

Shipments from South America, Mexico, Canada and Australia will be, for the most part, in crude form for refining in American refineries. Present domestic refining capacity is greater than crude production in this country, and is in excellent condition to handle imported crude. The greatest problem will probably be the arrangement of shipping facilities, especially from Australia.

Industry Expansion:

Expansion of copper mining and refining facilities has been under way for some time, aided by the Defense Plant Corp., and funds from the Reconstruction Finance Corp. In Arizona, an original $44,000,000 crude production expansion program was supplemented by an additional program that will cost $28,000,000 more. DPC aided the Castle Dome Copper Co., Miami, Ariz., in a $9,000,000 program for expanding existing mining facilities, and aided Phelps Dodge Corp., in the $28,000,000 construction program at their Castle Dome properties at Morenci, Ariz. On completion, the Phelps Dodge plant will yield 91,000 tons of refined copper a year and will likely be enlarged to a capacity of 135,000 tons a year by 1943. In addition, an open pit mine, costing $35,000,000 began operations near Castle Dome, Ariz., late in December.

Zinc

THE zinc industry has had, productively speaking, a rather remarkable year. Considering that in 1939, mining and refining began to sharply decline because the tariff was lifted on imported zinc, the rapid productive recovery of the industry in the past year is interesting.

Slab zinc production in 1941 amounted to nearly 862,000 tons, as compared with the net production of 706,100 tons in 1940 and 538,198 tons in 1939. During the first half of 1941, the average monthly production was 68,482 tons, up from a monthly average in 1940 of 58,842 tons. However, the average monthly production from July to November sharply increased to 73,816 tons, and is expected to remain at this rate or increase slightly during the coming year.

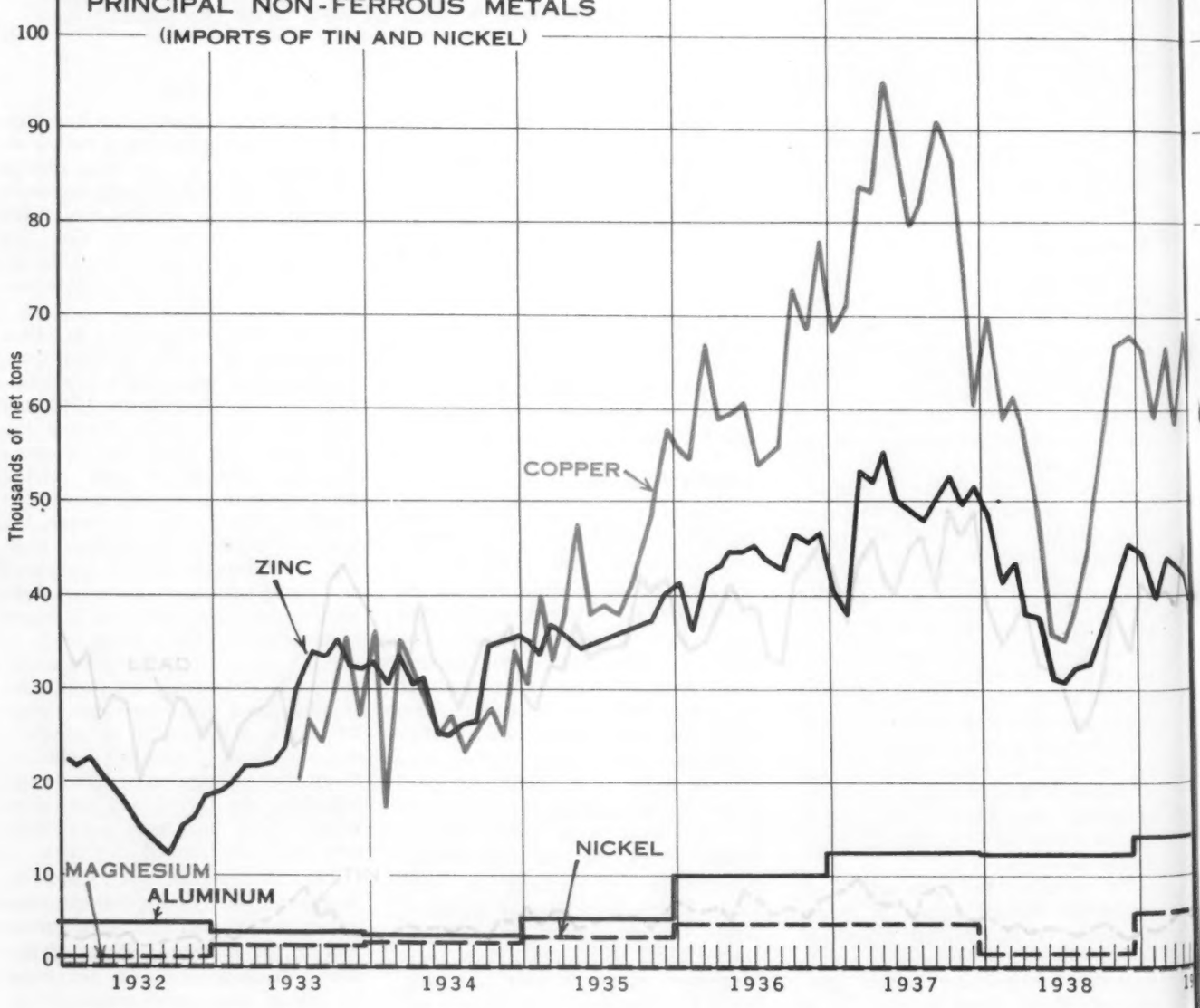
Such an increase in production cannot be considered too lightly, as in most cases these increases result from the restoration of obsolete and expansion of existing facilities. Work that requires many months to complete. As far as can be determined there has been very little new production added this year.

The Evans-Wallower plant at Monsanto, Mo., was almost completely rebuilt and is now in operation as the Monsanto Plant of the American Zinc, Lead & Smelting Co. Also, plans are complete but work has not yet begun for doubling the capacity of this plant. It will be late in 1942 before this new program will be completed. At Corpus Christi, La., the American

Smelting & Refining Co. is building an electrolytic smelting plant which will go into production next August. A zinc recovery plant was opened at Tooele, Utah, by the International Smelting & Refining Co., a subsidiary of Anaconda Copper Co., and is expected to yield 14,600 tons of refined slab zinc annually. Also, the MRC has under consideration the erection of a smelter at El Paso, Tex., for refining some 50,000 tons of Mexican concentrates stored there. Through a lease agreement with DPC, the American Zinc Co. plans to expand existing facilities at East St. Louis, Ill., sufficiently to produce 17,000 tons of electrolytic slab zinc and 7200 tons of retort slab zinc annually. This exparsion will cost about $4,000,000.

In 1942, production of all grades of slab zinc, including the expected production from new units that will be operating, is estimated at 953,000 net tons. To this production will be added some 36,000 tons of zinc available from the Rosita, Mexico, smelter of the American Smelting & Refining Co., making a total available supply of some 989,000 tons of zinc domestically produced.

MRC has been active in foreign zinc markets and has been purchasing quantities of zinc concentrates. The production of domestic metal and zinc pigments in 1941 required about 2,000,000 tons of zinc concentrates, 1,600,000 tons of which were produced in the United States and 400,000 tons imported. In 1942, with increased metal production of about 75,000 tons, an additional 165,000 tons of concentrates will be required. The adjustment in zinc prices made in October and the establishment of a six-day production week in some mines is expected to bring out a total of 1,750,000 tons of concentrates, so that in 1942 between 400,000 and 500,000 tons will be required from foreign

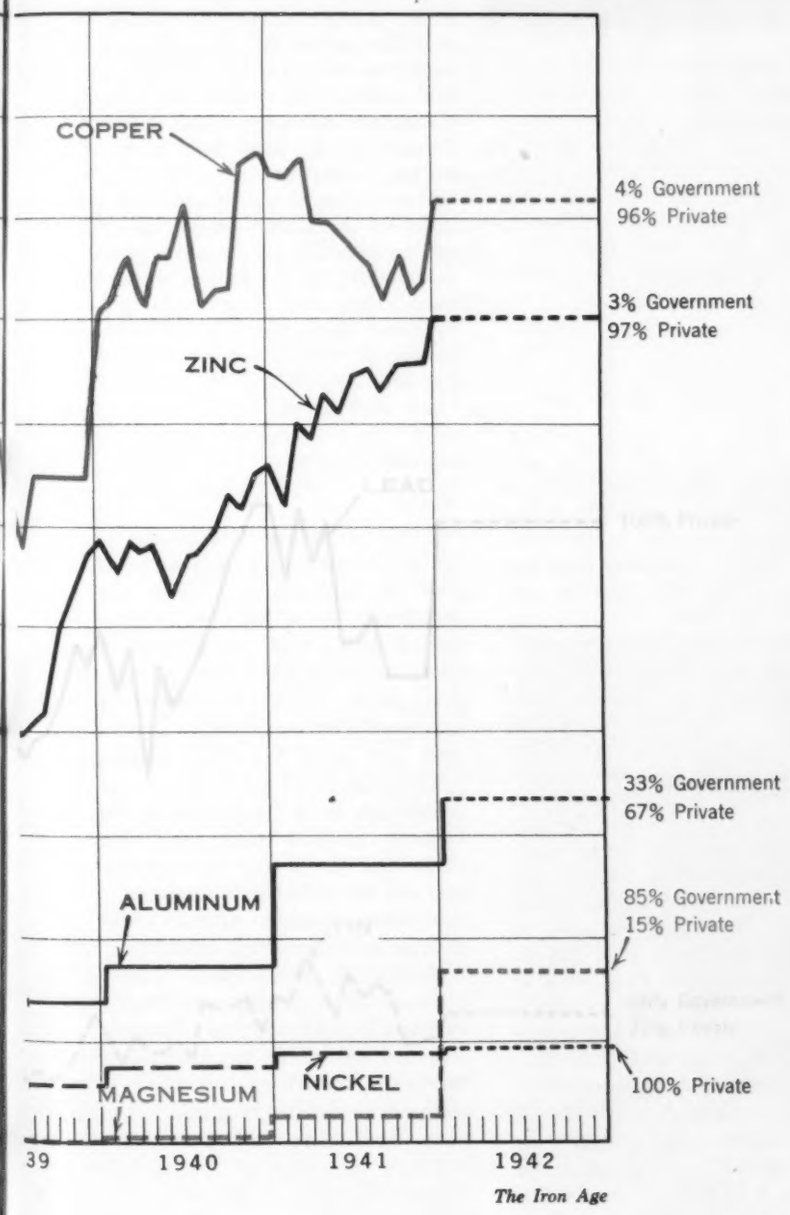


sources. The concentrates, it is believed, will be available from Mexico, Canada, South America and Australia if adequate bottoms can be arranged for the material shipped by water.

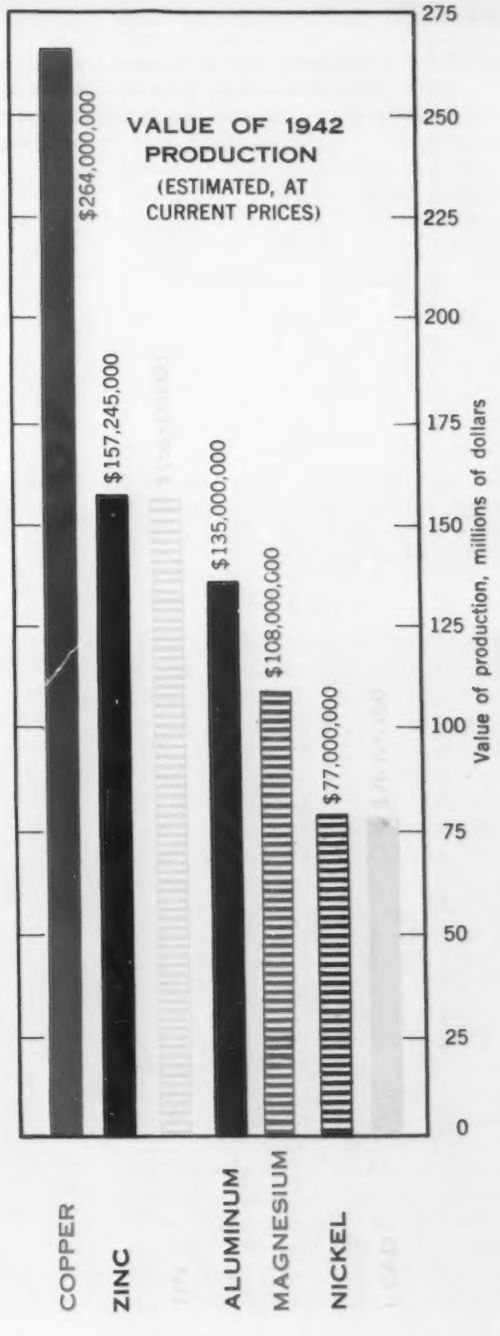
Zinc consumption in 1942 based on figures published by the U. S. Bureau of Mines, will amount to 936,000 tons, of which 312,000 tons are needed for galvanizing; 240,000 tons for brass mill requirements; 120,000 tons for die casting; 84,000 tons for rolling mills; 18,000 tons for oxide plants; 150,000 tons for export, and 12,000 tons for other uses.

These estimates, however, are variable, and from data collected by Howard I. Young, president of the American Zinc, Lead & Smelting Co., it is believed that brass mills will possibly need an additional 120,000 tons; die casters will need about 20,000 tons less than estimated because of curtailment in automobile production; and rolling mills will not consume more than 67,000 tons. Thus, by this adjustment of the Bureau of Mines estimates, there will be a potential consumption of zinc in 1942 of 1,019,000, or 30,000 tons in excess of estimated production. By 1943, when all units now planned or under construction are completed, the production will be adequate for this consumption, unless military requirements sharply increase, but until then greatest reliance will probably be on imports of refined metal from South America.

The action of various government agencies likewise has had a definite effect on the zinc industry during 1941. Early in the year came the stabilizing of prices, followed by a mandatory price ceiling which, in October, was raised 1c. a lb. by OPA. The upward adjustment in prices resulted from the OPM appeal for increased production, and was accompanied by adjustments in the prices of the vari-



The Iron Age



• • • High purity zinc is tapped from a melting furnace and poured into molds. Uses of zinc are numerous—particularly important are the quantities going into brass, die castings and galvanizing.

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ous zinc products. Zinc has been under strict allocation by OPM since July, when the M-11 distribution order was issued.

Lead

LEAD, one of the commonest of domestically produced metals, has to a great extent borne the brunt of substitution for scarce metals. When tin and aluminum foil manufacturers found supplies cut off, they turned to lead, as did manufacturers of copper pipe, paint and other commodities. This, together with normal consumption that was bound to increase because of defense, has created a shortage of lead that is becoming as acute as the shortages of other non-ferrous metals.

Lead was the last non-ferrous metal to be placed under priority control, and held comparative freedom of distribution until Oct. 4, when OPM issued General Preferince Order M-38, which covered the distribution of all supplies including domestic and imported metal and set up a pool system to be used for emergency needs. Also, after adhering to a stabilized price for many months, OPA established a formal price ceiling of 5.70c. a lb., East St. Louis, on lead in October. Price ceilings on secondary lead are being considered and may be announced at any time.

Lead production from domestic and foreign ores during the past year amounted to 622,650 tons, more than an average of 50,000 tons a month. Current production is estimated at the rate of 470,000 tons a year from domestic ores and 130,000 tons a year from foreign ores. These supplies were augmented by imports of foreign pig and metal recovered from scrap, making a total available supply of some 1,086,000 tons in 1941. However, consumption in 1941 was in the neighborhood of 1,000,000 tons, and an appreciable increase is expected in 1942. Government sources recently estimated that domestic requirements of pig lead for 1942 will be about 100,000 tons a month or about 1,200,000 tons a year, of which primary defense needs for the Army, Navy and Marine Corps will require from 47,000 to 50,000 tons a month.

On the supply side for the coming year, it was stated that 600,000 tons of pig lead will be available at current production rates. To this may be added about 150,000 tons that can be recovered from secondary sources and scrap. Also, Metals Reserve Corp. has standing contracts with Mexico, Canada, Australia and Peru for substantial shipments of pig lead to the United States. At the present time, lead in quantities of 150,000 tons a year is coming in from Mexico, 40,000 tons a year from Peru, and, while shipments at the rates of 96,000 tons and 44,000 tons a year were expected from Canada and Australia, these are somewhat behind schedule. Scheduled shipments from Australia during November and December didn't arrive, and, with the war in the Pacific, may not arrive for quite some time. Canadian shipments have fallen off from 8000 to 5000 tons a month, perhaps because Canadian producers anticipate an upward adjustment of American lead prices and are withholding supplies until a definite decision on this score has been reached. All imported pig lead is being purchased by MRC and allocated, along with domestic production by OPM. MRC imports in 1941 were about 336,000 tons, and will likely remain around that amount in 1942.

Prices:

Lead prices seem to be the crux of the problem of increased production in the industry. The recent request by OPM for the industry to go on a six-day production week work schedule was made to increase production. Up to the present time, however, the St. Joseph Lead Co. and the United States Smelting, Refining & Mining Co. are the only producers on a six-day week basis. Others profess that high labor costs and extra pay for the added day are not offset by current prices, and they cannot afford such a change in their work schedule.

From all indications, there is plenty of lead mining, smelting and refining capacity in the industry at the present time to substantially increase production, but prices are claimed to be unfavorable. It has been persistently stated by producers and members of the industry that an increase in the price of pig lead from 5.70c. a lb., to perhaps 7 or 7.5c. a lb., St. Louis, would increase lead production to nearly 100,000 tons a month. These higher

prices would enable western producers, who have high costs, to increase their mining operations and would also permit a certain amount of exploration and development work in the industry that has been curtailed because of unfavorable price restriction. Furthermore, such an increase would also have a very favorable effect on zinc production, it is claimed.

Congressional investigations are now under way to determine whether a price increase in lead is advisable and necessary to expand production to consumption levels.

One of the latest developments that brings home how acute the lead supply situation is getting is the effort now being made by OPM to curtail the production of tetra-ethyl lead for gasoline. Having been aware for many months of the potential gasoline shortage, OPM deemed curtailment of the production of tetra-ethyl advisable in spite of the fact that this will cause gasoline consumption to be increased nearly 1,250,000,000 gallons during the next year. Manufacturers of tetra-ethyl lead used 52,000 tons of pig lead in 1941, and consumption will total nearly 73,000 tons if OPM does not curtail production.

As to the supply situation for the civilian consumer during 1942, little need be said. Military requirements would have increased greatly without United States' entry into the war, but since this country has been forced into actual hostilities, requirements will be much greater. Consequently, civilian users will have to find substitutions, because before the end of the year it is believed supplies will be closed entirely. Large inventories in consumers' plants are being rapidly depleted, and what is still on hand may be called upon by OPM for direct military use.

Magnesium

A SURVEY of the non-ferrous metals would be incomplete without covering the light metals, magnesium and aluminum. The United States, and also the world, has entered a "Light Metal Age," necessitated by the huge demand for airplanes, light tools and a multitude of other commodities that must, by their nature or application, weigh as little as possible. Because of the expansion in aircraft construction since the beginning of the war, aluminum and magnesium have increased in importance so that no longer can they be considered minor metals. They were among the first metals to be placed under formal mandatory priority control of distribution.

Magnesium production in the United States has for the past decade been solely left up to the Dow Chemical Co., at Midland, Mich., but with the war in Europe, production facilities began to expand. In addition to doubling the capacity of the Midland plant, Dow built a new plant at Freeport, Tex., production in which started in January. By May, 1942, it will have attained its rated capacity of 18,500 tons a year, and will be further enlarged to a projected maximum annual production of 54,000 tons.

Expansion Program:

Newcomers into this field of magnesium production are rapidly constructing producing facilities, and shortly will begin operations. The Permanente Chemical Co., a subsidiary of the Todd-California Shipbuilding Corp., at Permanente, near San Jose, Cal., is now producing 4000 tons a year, and is expected to be operating at maximum capacity of 12,000 tons a year by the end of 1942. The government and corporation officials are now considering the expansion of these production facilities to 24,000 tons a year. Other plants, not yet in operation, are shown in Table I, on page 120, and are expected to be operating at capacity by the end of 1942. These plants will bring the magnesium production rate up to 200,000 tons a year by 1943.

Expansion of magnesium production has been chiefly with the aid of the government, through the Reconstruction Finance Corp., and its subsidiary, the Defense Plant Corp. Of the projected 200,000-ton capacity, 85 per cent or 170,000 tons a year will be government owned and leased to the operating firms.

According to reports from the U. S. Bureau of Mines, magnesium metal by these producers will be extracted from five principal sources. Dow Chemical Co., at Midland, uses underground brines, the sole source of American production from 1927

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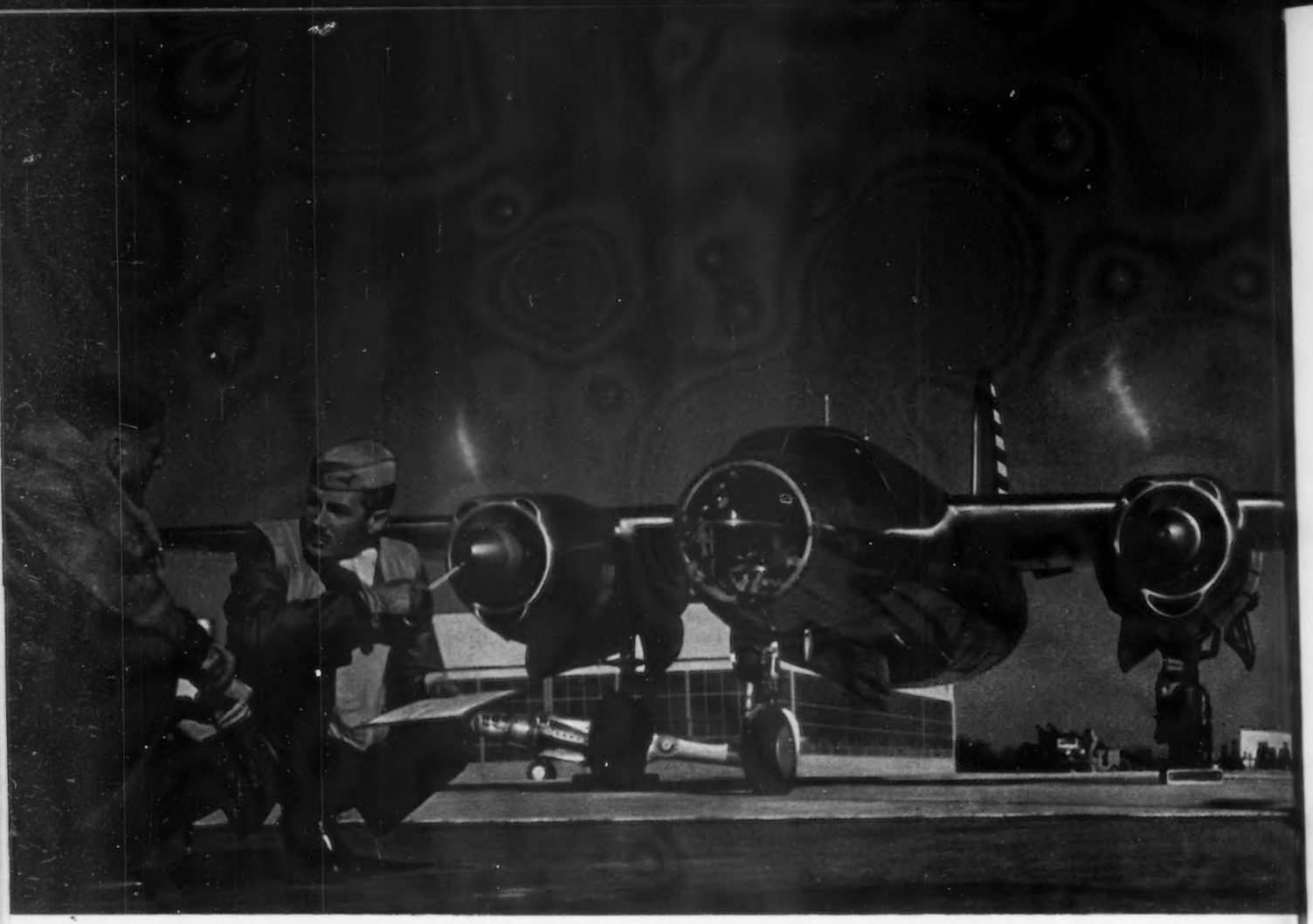
• • • Chinese workmen at Billiton Tin Mining Co., Netherlands East Indies, drilling dynamite holes with American-made drills. After blasting, the material is sent to a washing plant for separation.



• • • Here is one way aluminum and magnesium go to war. This is the famous Martin B-26, a medium bomber that is battering the Axis in every war theater.

until 1941. The largest proved reserves of brines containing magnesium salts are those in the Saginaw-Midland basin, where the brine has a magnesium chloride content equivalent to about 0.8 per cent metallic magnesium. At Freeport, Tex., sea water is used, where the metallic magnesium content is equivalent to about 0.013 per cent. Permanente Chemical Co. and Basic Magnesium, Inc., use magnesite, with an average magnesium content of about 26 per cent, and Permanente uses the *Hansgirg process to recover the metal.

** Described in The Iron Age, issue of Aug. 28, 1941, p. 50.*

Matheison Alkali Works, Inc., and Diamond Alkali Corp. will use dolomite, with 12 to 13 per cent magnesium content, and Union Potash & Chemical Co., at Austin, Tex., will use Langbeinite or dolomite. The metallic magnesium content of Langbeinite averages about 4.3 per cent. Currently, 40 per cent of the metallic magnesium produced in this country is made from magnesite, 27 per cent from sea water, 23 per cent from dolomite and 10 per cent from brine and potash salt.

Consumption:

Consumption of magnesium tremendously increased during the past decade, rising from 354 tons in 1932 to 5766 tons in 1940, and by the end of the coming year is expected to reach the projected production capacity of 200,000 tons, or 32 times that of 1940.

Magnesium is used in a variety of industries, both as a prime metal and an alloying agent. The general uses include: Magnesium alloys in construction or fabricated materials, as an alloying agent in aluminum, as an alloying agent in zinc and other non-ferrous alloys, as a deoxidizer and scavenger in removing bismuth from lead and cleansing a variety of non-ferrous metals, in the manufacture of pyrotechnics such as ammunition and flares, and as a catalyst or catalytic agent in forming complex organic compounds.

Of the 30,000 tons of magnesium produced in 1941, about 19,500 tons were used in the manufacture of fabricated products, 9000 tons in aluminum, copper, zinc and other alloys, and 1500 tons in the manufacture of pyrotechnics, chemicals, as deoxidizing agents, and other uses.

The aircraft industry alone is the greatest industrial user of magnesium. In 1941, 15,600 tons of magnesium went into airplane construction, of which 60 per cent, or 9360 tons, was used in engines and the remainder for frames, wheels, etc. In the construction of a fighter plane, about ½ ton of magnesium is required, while the amount used in heavier planes naturally is greater.

Magnesium was placed under

mandatory priority control in March, and in November, OPM requested a detailed report of all stocks of magnesium and magnesium products not used for military production, at the same time placing magnesium on a monthly allocation basis. These private stocks will be requisitioned by the OPM as needed, and cannot be used in the manufacture of non-essential commodities.

Aluminum

ALUMINUM productive capacity, like that of magnesium, is being expanded tremendously and rapidly. Until 1940, the Aluminum Co., of America had the production field to itself, but newcomers into the field include the Reynolds Metals Co., Bohn Aluminum & Brass Co., Union Carbide & Carbon Co., and the Olin Corp. Aluminum production increased about 33 per cent from 1940 to 1941, production totaling in 1940 about 206,280 tons and in 1941 approximately 300,000 tons. Production in 1942 is expected to top 450,000 tons.

The Office of Production Management placed the aluminum requirements for war needs at over 800,000 tons a year, recommending the production of 700,000 tons by the United States and the importation of the necessary additional 100,000 tons from Canada.

Expansion of the production of aluminum has been chiefly by financial aid from the government, through the Defense Plant Corp. Of the total projected aluminum capacity, the government owns 37.5 per cent while 62.5 per cent is company owned. Of the 1,537,000-ton alumina production program, the government owns 33 per cent and 67 per cent is privately owned, as shown in Table on page 120.

Prices:

Price wise, aluminum has been different from many other materials that are required for war, having been on a continual decline during the war period. Following three, 1c. a lb. price reductions in 1940 on 99 per cent-plus pure ingot aluminum, the price again was reduced from 17c. to 15c. a lb. on Sept. 30, 1941. These price reductions also included adjustments in prices on fabricated aluminum products.

Production of aluminum in 1941 totaled about 300,000 tons, to which was added nearly 70,000 tons of metal from secondary sources. At present the industry is operating at the rate of 400,000 tons a year, and will be producing at the rate of 700,000 tons a year by the end of 1942, and 750,000 tons a year in early 1943.

Present military requirements are estimated to be 600,000 tons a year. The aircraft industry, the largest user of aluminum will need about 50 per cent of the available supply as of July, 1942, on the basis of the present aircraft construction program. With any step-up of aircraft construction that may be in the offing, the requirements of the industry will proportionately increase. Increased naval construction has also placed a heavy demand upon the industry for aluminum, as have the increased operations of the steel industry. Currently Canada is supplementing domestic supplies at the rate of 20,000 tons a year, but is expected to increase shipments to the United States in 1942 by 80,000 tons.

Ore Supplies:

While aluminum is the most abundant of all the commonly used industrial metals in the earth's crust, being almost twice as plentiful as iron, the position of the United States in regard to ore for this metal is vulnerable, since it appears that known supplies of bauxite, the only commercial aluminum ore, are approaching exhaustion.

The U. S. Bureau of Mines, with the Geological Survey, recently estimated that alumina content of bauxite reserves in the United States totals 32,511,360 tons, including 10,464,160 tons of grade A ore, assaying at 55 per cent Al_2O_3; 9,965,760 tons of grade B, assaying at 50 to 55 per cent Al_2O_3; 9,440,840 tons of grade C, assaying between 45 and 50 per cent; and 32,511,360 tons of grade D, assaying between 30 and 45 per cent.

Unless the war or economic sanctions hinder South American trade, there probably is nothing serious regarding this condition, since it is expected that abundant supplies can be imported from Suriname, in Dutch Guiana, which currently is the source of 60 per cent of our supply. Also, it is expected that bauxite will be available from other large deposits in South America, Africa, and other parts of the world. From a standpoint of defense, however, United States can hardly afford to depend upon other countries for its bauxite. Consequently, investigations by the United States Bureau of Mines and the Geological Survey into other sources from which aluminum can be extracted are under way, partially completed. Investigations to date reveal that in addition to bauxite, other materials in this country that will yield aluminum include alunite, kaolinite clay, shale, nepheline syenite, feldspar mica, Wyomingite, prophyllite, kyanite and coal ash, the last of which exists in inappreciable quantities.

Tin

METALS for which the United States depends on foreign sources entirely are tin and nickel. In tin circles during the past year establishment of ceiling prices for domestic sales by OPM and the renewal of the British tin cartel for another five years were among the most significant events. Imports until the end of September, chiefly from the Netherlands East Indies, averaged close to 12,000 long tons a month. With the beginning of October, Russia came into Far Eastern markets, and forced American buyers of refined tin from the markets since they were limited in their selling price to 52c. a lb. Consequently, since October imports have dropped to between 8000 and 9000 long tons a month. Further restrictions on tin imports came as a result of the increase of war risk insurance rates from 1 to 1¾ per cent in December, and another increase when the United States entered the war. This increase was from 1¾ to 10 per cent for trans-Pacific and Panama Canal deliveries.

1941 Imports:

Total imports of refined tin in 1941 were about 160,000 long tons, 100,000 to 120,000 long tons of which went into use during the year, and about 40,000 long tons into the government stockpile. In addition to the imports of tin for domestic consumption by commercial importers, the government, through MRC, has been active in foreign tin markets. On Oct. 22, total government purchases of refined tin for the MRC stockpile amounted to 66,976 long tons, of which 40,392 tons were delivered and 2500 tons were afloat. Money has been appropriated for

TABLE I—Magnesium Production Expansion Program

Company	Plants	Now in Production (net tons)	Proposed Production (net tons)	Projected Annual Capacity (net tons)	
				Company Owned	Government Owned
Dow Chemical Co.	Midland, Mich.	9,000		*9,000	
	Freeport, Tex.	9,000	45,000	*9,000	45,000
Todd-California Shipbuilding Corp.	Permanente at San Jose, Cal.	4,000	8,000	†12,000	§
Basic Magnesium, Inc.	Nevada		56,000		56,000
Mathieson Alkali Works, Inc.	Lake Charles, La.		18,000		18,000
Diamond Alkali Corp.	Painesville, Ohio		18,000		18,000
International Agricultural Corp., through subsidiary; Union Potash & Chemical Co.	Austin, Tex.		12,000		12,000
Unnamed	Unnamed		21,000		21,000
TOTAL		22,000	178,000	30,000	170,000

U. S. Bureau of Mines

*—Small part British financed.
†—Reconstruction Finance Corp., financed.
§—Considering 12,000 ton additional capacity.

TABLE II—Aluminum Production Expansion Program

Company	Plant Location	Alumina Capacity (net tons)		Aluminum Capacity (net tons)	
		Company Owned	Government Owned	Company Owned	Government Owned
Aluminum Co. of America	E. St. Louis, Ill.	365,000			
	Mobile, Ala.	560,000‡			
	Bauxite, Ark.		250,000△		
	Arkansas		250,000△■		
	Alcoa, Tenn.			150,000	
	Massena, N. Y.			74,500	75,000
	Vancouver, Wash.			82,500	
	Badin, N. C.			44,500	
	Niagara Falls, N.Y.			19,000	
	Malvern, Ark.				50,000
	Troutdale, Ore.				45,000
Reynolds Metals Co.	Listerhill, Ala.	100,000**		50,000**	20,000■
	Longview, Wash.			30,000**	
Bohn Aluminum & Brass Co.	Los Angeles*				35,000
Union Carbide & Carbon Co.	Spokane, Wash.				30,000■
Olin Corp.	Marysvale, Utah†		12,000■		
	Tacoma, Wash.				15,000■
Total Government and Company Owned		1,025,000	512,000	450,500	270,000
TOTAL		1,537,000		720,500	

U. S. Bureau of Mines

*—Built by Aluminum Co. of America.
†—Operated by Kalunite, Inc., subsidiary of Olin Corp.
‡—Possibility that 160,000 tons may be Government owned.
**—Government financed.
△—Capacity may be combined as one plant.
■—Recommended, but not under contract Sept. 30, 1941.

the purchase, at 50c. a lb., of 143,108 tons, 60,082 tons of which are now under contract and 83,026 tons not as yet under contract. The Chinese government recently offered 36,000 tons of tin as security for an American loan, and 24,082 tons have been purchased but delivery has not yet been made. In addition to these purchases of refined tin, considerable stocks of concentrates are being imported.

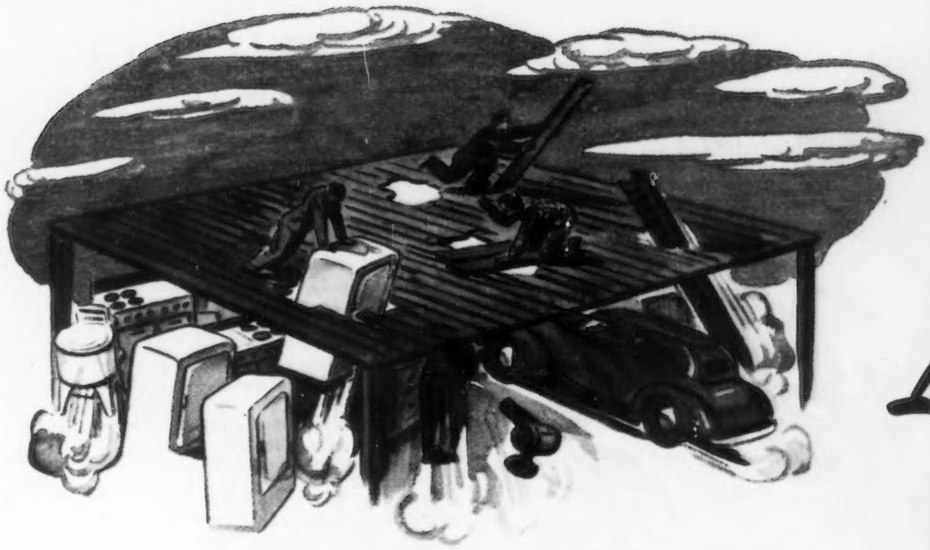
The government has purchased 24,453 tons of ore, which have been delivered. There are 290 tons of ore enroute to the United States and 253,802 tons on order, making the potential ore imports total about 278,545 tons, valued at $122,434,000, or about $440 a ton. MRC has been receiving about 3600 tons of Bolivian ore a month, and Netherlands East Indies concentrates averaging 4000 tons a month are currently being imported. Under contract now are 90,000 tons of Bolivian ore, 20,000 tons of Netherlands East Indian ore, and 2500 tons of Mexican and South African ore. These concentrates are being stored preparatory to completion in February of the new $4,000,000 tin smelter being constructed at Texas City, Texas, by the Defense Plant Corp., under the direction of N. V. Billiton Maatschappij, New York. The Dutch firm will get a percentage of the cost of construction, will supply much of the Straits ore used, operate the smelter and get a percentage of the profit from the enterprise. Bolivian ore, being a low grade ore, will be mixed with the high grade Straits ore to raise the quality of the refined metal from the Texas smelter. The importance of this smelter, however, cannot be estimated until such a time as it actually produces tin, the quality of which can be compared with the present supplies, especially in the manufacture of tin plate.

Imports of refined tin by commercial importers, excluding government imports, during 1941 amounted to about 145,000 long tons, a new all-time peak. These import figures, computed by the Tin Research Institute up to October, are estimated for November and December and are subject somewhat to revision.

Consumption:

All considered, tin users are in a relatively better position than users of other non-ferrous metals. The steel industry, the greatest industrial user of tin, has about a

(CONTINUED ON PAGE 203)



Metal Industry PRICE CEILINGS

OPA maximum quotations on metals, machinery and other products as of Dec. 19, assembled by THE IRON AGE, are published on the following pages. Each week this publication carries a list of latest price schedule revisions and new orders. See THE IRON AGE Allocations and Priorities Guide for complete information, in usable form, about material distribution.

DETAILS of maximum price schedules established by the Office of Price Administration on products used or manufactured by the metal working industry are contained in this section. The descriptions have been shorn of their legalistic terminology, but all essential information is presented.

It is important to note that these schedules set forth maximum prices only. Any product covered by a schedule can be sold below this maximum. Each schedule is intended to cover all phases of the sale of the specific commodity. If the terminology used suggests that certain types of product are not covered, the proper procedure, before assuming there was no control over the item, would be to present your case to OPA and ask its advice.

The spirit, as well as the letter, of these schedules should be observed. The burden of proof, in any event, will rest with the persons directly involved in any transaction. It is thus imperative that detailed reports be kept on all dealings. This is specified in all the orders, but it is apparent that possession of accurate, extensive data will simplify settlement of all questions that may arise and in addition to saving time, will undoubtedly be considered as a favorable factor in weighing the merits of a case.

Thus far, the OPA has been slow to wrath. But there are many signs pointing to a more strict enforcement of schedules in the future. In addition to the usual possibilities of prosecution and the resulting publicity, many of the later schedules state that government procurement offices will be requested to refrain from purchasing from persons failing to comply with the schedule.

If any question arises, the actual order should be consulted first. Copies of these orders are kept on file at the offices of THE IRON AGE, 100 East 42nd Street, New York, and may be inspected there. Copies may also be obtained upon request from the local OPA office, or from the Washington office of the price agency.

All new schedules and revisions are reported weekly in THE IRON AGE. The feature "This Week's Prices and Priorities," published each week provides a quick means of determining whether any new orders have been issued affecting your plant operations.

How to Use This Price Guide

First refer to the section "Index of Products Under Price Ceilings," page 122. Following each product listed there is the number of the price schedule (OPA's identification number), as No. 6, No. 12, etc. Then locate this number in the section "Price Ceiling Check List." This tabulation tells the effective date of the order, the forms which must be used and the page on which the detailed price schedule appears in this issue.

Important: Be sure to consult the official text of the schedule whenever a question arises. If you can't find the answer in the official text, then consult OPA, preferably by means of the nearest regional office. If circumstances force you to establish a price before an opinion from OPA can be obtained, be sure to maintain complete records of the transaction and advise OPA of your action, together with the facts which guided you.

Faster Driving • Fewer Operations • Stronger Fastenings = 50% Less Assembly Cost with Phillips Screws!

Consider the more frequent use of power drivers with Phillips Screws. There's no danger of driver point slipping from a Phillips recess, so there's no need to go slow. Phillips cuts actual screw-*driving* time to a fraction.

Add the saving through eliminating the extra work required with slotted screws—drilling pilot holes, two-handed starting, withdrawing crooked screws, driving in awkward positions, etc. Phillips Screws set up tight—without split screw heads or burrs — at an average cost saving of 50%.

Busy defense plants are using Phillips for double-quick assembly *speed*. Non-defense plants use Phillips for 50% less assembly *cost*. Get the facts from one of the firms listed below.

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WOOD SCREWS • MACHINE SCREWS • SHEET METAL SCREWS • STOVE BOLTS • SPECIAL THREAD-CUTTING SCREWS • SCREWS WITH LOCK WASHERS

U. S. Patents on Product and Methods Nos. 2,046,343; 2,046,837; 2,046,839; 2,046,840; 2,082,085; 2,084,078; 2,084,079; 2,090,338. Other Domestic and Foreign Patents Allowed and Pending.

American Screw Co., Providence, R. I.
The Bristol Co., Waterbury, Conn.
Central Screw Co., Chicago, Ill.
Chandler Products Corp., Cleveland, Ohio
Continental Screw Co., New Bedford, Mass.
The Corbin Screw Corp., New Britain, Conn.
International Screw Co., Detroit, Mich.
The Lamson & Sessions Co., Cleveland, Ohio
The National Screw & Mfg. Co., Cleveland, Ohio
New England Screw Co., Keene, N.H.
The Charles Parker Co., Meriden, Conn.
Parker-Kalon Corp., New York, N.Y.
Pawtucket Screw Co., Pawtucket, R.I.
Pheoll Manufacturing Co., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N.Y.
Scovill Manufacturing Co., Waterbury, Conn.
Shakeproof Inc., Chicago, Ill.
The Southington Hardware Mfg. Co., Southington, Conn.
Whitney Screw Corp., Nashua, N.H.

Index of Products Under Price Ceilings

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Copper hardware—No. 40
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Jobbers' prices—No. 49

Lithographers plates—see Zinc
Locks—No. 40

Machine tools, second hand—No. 1
Methanol—see Wood alcohol
Monel scrap and shot—No. 8

Nickel scrap, including monel and stainless, and secondary monel ingot and shot, and secondary copper-nickel shot—No. 8

Pig iron—No. 10

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Scrap, aluminum—No. 2
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(See also Relaying rails)

Tin—No. 17

Used steel drums—No. 43

Warehouse prices—No. 49
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Zinc, rolled—see page 123

Price Ceiling Check List

PRICE schedules affecting the metal working industry issued thus far by the Office of Price Administration are listed below, together with dates the orders became effective and forms required by the order. Schedules not affecting the metal working industry are not listed. Copies of the specified forms are obtainable upon request to Office of Price Administration, Washington.

SCHEDULE NUMBER	SUBJECT	EFFECTIVE DATE	RELATED FORM	SEE PAGE
1	Second-hand machine tools	2-17-41	100:1 100:1 Rev.	124
2	Aluminum scrap and secondary aluminum ingot	3-24-31	102:2 102:3	124
3	Zinc scrap and secondary slab zinc	3-31-41	103:3 103:5	126
4	Iron and steel scrap	4-3-41	104.8	*
5	Bituminous coal (revoked 5-1-41)			
6	Iron and steel products	4-17-41	.....	154
8	Scrap of the following types: pure nickel, monel, stainless, nickel steel, and other scrap materials containing nickel; also secondary monel ingot, secondary monel shot, and secondary copper-nickel shot	6-2-41	108:2 108:5	126
10	Pig iron	6-24-41	.....	130
12	Brass mill scrap	7-22-41	112:1	130
15	Copper	8-12-41	.....	132
17	Pig tin	8-16-41	.....	132
20	Copper scrap	8-19-41	.....	134
21	Formaldehyde	8-20-41	121:1	136
27	Anthracite (revoked 9-18-41)			
28	Ethyl alcohol	9-15-41	128:1	138
29	Coke, by-product foundry and furnace grades	10-1-41	.....	136
31	Acetic acid	9-29-41	131:1	140
34	Wood alcohol (methanol)	10-10-41	134:1	140
36	Acetone	10-27-41	136:1 136:2	142
37	Normal butyl alcohol	10-27-41	137:1 137:2	142
38	Glycerine	11-10-41	138:1	144
40	Builders' hardware and insect cloth	11-19-41	.....	146
41	Steel castings	11-15-41	141:1	148
43	Used steel drums	12-1-41	.....	148
46	Relaying rails	12-2-41	146:1	150
49	Iron and steel resale prices	12-15-41	.....	152
	Rolled zinc	11-29-41	.....	123

*These prices are published weekly in THE IRON AGE.

Rolled Zinc

Material	Price
Sheet zinc	13.15c. per lb., f.o.b. mill
Carloads (36,000 lb.) and over	7% discount
Ribbon or strip zinc	12.25c. per lb., f.o.b. mill
3,000-lb. lots	1% discount
6,000-lb. lots	2% discount
9,000-lb. lots	3% discount
18,000-lb. lots	4% discount
Carload lots	7% discount
Zinc plates—	
Small (not over 12-in.):	
Lots of 1,000 lb. and over	11c. per lb., f.o.b. mill
Lots of less than 1,000 lb.	12c. per lb., f.o.b. mill
Large (over 12-in.):	
Lots of 1,000 lb. and over	12c. per lb., f.o.b. mill
Lots of less than 1,000 lb.	13c. per lb., f.o.b. mill
Zinc engravers' plates—	
Raw	14.25c. per lb., f.o.b. mill
Carloads (36,000 lb.) and over—7% discount.	
Finished	21.25c. per lb., delivered
Zinc lithographers' plates—	
Carloads (36,000 lb.) and over—7% discount	15c. per lb., f.o.b. mill

Notes:

No schedule number has been given this listing of maximum prices, nor has the effective date been indicated. The announcement itself (PM1664) was issued Nov. 24, 1941. and said, "A list of maximum prices for rolled zinc sheets, strip and plates, which has been prepared by OPA in the light of the recent 1c. a lb. increase in the price of slab zinc, was made public today by OPA."

Price Schedule No. 1

Second Hand Machine Tools

(Exclusive of extras)

Date of Manufacture	Condition (see below)	Maximum Price*
1. Jan. 1, 1936, and after	A	95%
	B	75%
2. Jan. 1, 1930, to Dec. 31, 1935	A	90%
	B	70%
3. Jan. 1, 1920, to Dec. 31, 1929	A	80%
	B	60%
4. Before Jan. 1, 1940	A	70%
	B	60%

A—Rebuilt and guaranteed. B—Others.

*Price expressed in terms of percentage of the March 1, 1941, price of equivalent new machine tool. Prices in above table include commissions.

Notes: Schedule issued Feb. 17, 1941. Date of manufacture can be determined from serial number stamped on machine by manufacturer. Rebuilt and guaranteed tools are those which (1) have been rebuilt or are in equivalent condition to a rebuilt machine and is invoiced as such; (2) have been tested under power so as to prove that they have a performance essentially equivalent to that of the machine when new, and (3) carry a binding guaranty of satisfactory performance for a period of not less than 30 days from date of shipment.

A rebuilt machine is one in which worn or missing parts have been replaced or reworked and which has been tested under power so as to prove it has a performance substantially equivalent to that of the machine when new.

Machine tools formerly equipped with a cone drive are now often manufactured with a geared head. In such cases determine the price of an equivalent new machine by deducting 20 per cent from March 1, 1941, price of the new geared-head tool. Each dealer must file with OPA a report (Form 100:1) on each floor type second-hand machine tool in his stock or purchased through him, and a report on each tool sold or otherwise disposed of.

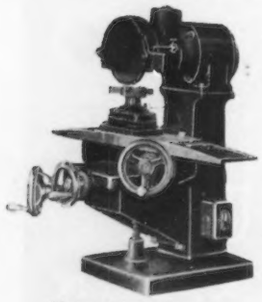
"Machine tool" includes all machines for the cutting, abrading, shaping, forming or joining of metals.

Strickland Precision Universal Ball Joint Vise

This Vise is applicable for milling angular pockets for carbide blanks. It is equally useful on a Universal Cutter and Tool Grinder in grinding clearance angles with cup wheels on Stellite, High Speed Steel, and Carbide Tools. Also highly efficient in setting tools on Surface Grinders to grind chip-breaker grooves, curlers and rake angles on both carbide and other cutting tools.

All settings on any horizontal angular position, or in combination with any vertical and horizontal angular position, or any compound vertical angular position combined with any horizontal angle are instantly obtained by matching the vertical degree graduations on the ball with the horizontal degree graduations on the base through the medium of a swivel matching ring, and rigidly clamped with a single movement. Specifications: Height 5", Width 5½"; Range 30 deg. arc through horizontal plane. Price $140.00. Leather dust apron furnished to cover ball and socket (not shown).

Strickland Precision Surface Grinder



Motor driven. Range—12"x6"x5½". Working surface—5"x12".

Equipped with Strickland Precision Universal Ball Joint Vise—Diamond chip-breaker grinding wheel—coolant reservoir—full electrical equipment.

Agents and distributors wanted. Write for descriptive literature.

E. M. Strickland

5135 Whitfield Detroit

Phone Tyler 5-0881 Michigan

Price Schedule No. 2

Aluminum Scrap and Secondary Ingot

Aluminum Scrap

(cents per lb., f.o.b. point of shipment)

Grade	Maximum Prices A*	B*	C*
Pure clips and cable†	10 c.	11 c.	11½c.
Alloy sheet clips, mixed or segregated	8½c.	9½c.	10 c.
Old sheet and utensils	9½c.	10½c.	11 c.
Cast scrap and forged scrap, old and new	10 c.	10½c.	11 c.
Borings and turnings, including No. 12	7 c.	8 c.	8½c.
Pistons free of struts	10 c.	10½c.	11 c.
Pistons with struts	8 c.	8½c.	9 c.

† Aluminum foil and light gage aluminum sheet which does not exceed 0.006 in. thickness is not considered within this price schedule.

*These prices apply under following conditions:

Price column A—Shipments in lots of less than 1000 lb.

Price column B—shipments in lots of 1000 to 20,000 lb. if shipped by truck or 1000 to minimum carload if shipped by rail.

Price column B—Shipments in lots of 20,000 lb. or more if shipped by truck or minimum carload if shipped by rail.

Prices (above) apply to scrap which is clean and dry and which otherwise meets generally accepted maximum standards of the trade. Scrap which fails to meet such standards should be sold at prices below the above ceilings at least in proportion to the content of moisture and other foreign matter.

Quantities in columns B and C may consist of various grades of scrap; other metals may not enter into the computation. It will be considered that the requisite quantity has been sold and shipped, in case delivery is made by truck, if such quantity is sold in one lot and delivery is made within a period of 72 consecutive hours. A minimum carload is the minimum quantity required to obtain the railroad carload rate from the point of shipment to the destination.

Aluminum Secondary Ingot

(cents per lb. f.o.b. point of shipment, for quantities of 30,000 lb. or more)

Grade	Maximum Price
98% pure ingot	15c.
Silicon alloys	15c.
Piston alloys	14½c.
No. 12 aluminum	14½c.
Deoxidizing aluminum	13½c.

Quantity Differentials

Following premiums may be charged, in addition to the maximum prices listed above, where sales are in the quantities specified:

Quantity	Premium
10,000 to 30,000 lbs.	¼c. per lb.
1000 to 10,000 lbs.	½c. per lb.
Less than 1000 lbs.	1c. per lb.

Notes:

Schedule became effective March 25, 1941. Tables above include Nov. 1 revisions. Detailed reports of all

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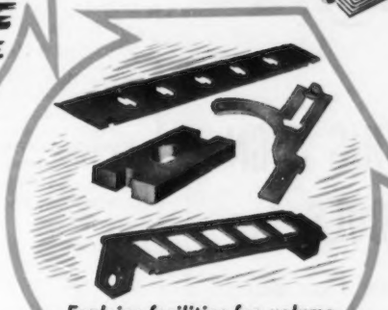

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sales and purchases must be kept by scrap makers, sellers and buyers.

Prices for special secondary aluminum alloys on which maximum prices have not been set shall not be in excess of the 17c. maximum for 98 per cent ingot unless an additional charge is necessary to cover costs of special ingredients or processes. Such additional charges must be computed on basis of not more than 17c. for aluminum content and other ingredients at not more than current market prices.

Price Schedule No. 3

Secondary, Scrap Zinc

Zinc Scrap

	Price, Cents per Lb.
(1) New clippings and trimmings	7.25
(2) Engravers' and lithographers' plates	7.25
(3) Old scrap	5.75
(4) Unsweated dross	5.80
(5) Die cast slab	5.80
(6) New die cast scrap	4.95
(7) Old die cast scrap	4.50
(8) Radiator grilles, old and new	4.95

Prices above are the maximum prices to be paid after free iron and other foreign materials are removed.

Notes: Original schedule became effective March 31, 1941.

Quantity premium of ½c. a lb. may be added for single shipments of 10,000 lb. or more on items (1), (2) and (3), or any combination of those grades; also on single shipments of 20,000 lb. or more of items (6), (7) and (8), or any combination of those grades. A single shipment means all deliveries made to a buyer within 48 consecutive hours.

Secondary, Slab Zinc

(Cents a lb.)	Table A	Table B
Prime Western or poorer grade	8.25	9.00
Brass special	8.35	9.10
Intermediate and better	8.50	9.25

Table A covers carload lots delivered buyer's customary rail receiving point and is quoted plus carload freight from East St. Louis to buyer's customary rail receiving point.

Table B covers less than carlots and is quoted f.o.b. seller's plant or warehouse plus carload freight from East St. Louis to seller's plant or warehouse.

For the purpose of this schedule, a carlot is taken to be the minimum quantity required to obtain railroad carlot freight rates from shipping point to destination.

The Iron Age

Price Schedule No. 8

Secondary, Nickel Scrap

TABLE I

Grade	Price, f.o.b. point of shipment
Pure Nickel Scrap	
Containing 98% or more nickel and not more than ½% copper.	26c. per lb. of material.
Containing 90% up to 98% nickel.	26c. per lb. of nickel contained; no payment for any other metals contained.
Converter's premium.	2c. per lb. of material.
Premium on shipments of 2000 lbs. or more at one time.	½c. per lb. of material.
Ferro-Nickel-Chrome-Iron Scrap	
Containing 20% up to 90% nickel.	26½c. per lb. of nickel contained; 8c. per lb. of chrome contained; no payment for any other metals contained.
Converter's premium.	1½c. per lb. of material.
Premium on shipments of 10,000 lbs. or more at one time.	½c. per lb. of material.
Ferro-Nickel-Iron Scrap	
Containing 14% up to 90% nickel and no chrome.	26½c. per lb. of nickel contained; no payment for any other metals contained.
Converter's premium.	1½c. per lb. of material.
Premium on shipments of 10,000 lbs. or more at one time.	½c. per lb. of material.
Monel Metal Scrap	
New monel metal clippings.	20c. per lb. of material.
Soldered monel metal sheet.	18c. per lb. of material.
No. 1 monel castings and turnings.	
Containing a minimum of 60% nickel, 30% copper, and not more than 3% free iron, clean and dry.	15c. per lb. of material.
Converter's premium.	2c. per lb. of material.

MILFORD PROFILE SAW HANGS THIS SIGN ON YOUR BASIC MACHINE TOOLS

MILFORD PROFILE SAW keeps your basic machine tools doing straight production work. Odd jobs of parts, special tools, dies, jigs, fixtures, etc., usually made on the drill press, shaper, milling machine, or other production equipment, are made to better advantage on a contour-sawing machine or any good vertical band saw machine, using Milford Profile Saw.

Look into this in your shop, but remember: A machine for contour sawing is no better than its saw. Milford Profile Saw is made by the world's largest, most experienced producer of metal-cutting band saw. Carried in stock by mill supply houses.

Write for free samples, giving specifications of blade you now use, or description of cutting job, and make of your machine.

THE HENRY G. THOMPSON & SON COMPANY, NEW HAVEN, CONNECTICUT

MILFORD PROFILE SAW

★ Also makers of Rezistor Hacksaw Blades

Premium on shipments of 20,000 lbs. or more at one time.	½c. per lb. of material.

Cupro-Nickel Alloy Scrap

Containing 90% or more combined nickel and copper.	26c. per lb. of nickel contained; 8c. per lb. of copper contained; no payment for any other metals contained.
Containing less than 90% combined nickel and copper	26c. per lb. of nickel contained; no payment for any other metals contained.
Converter's premium.	2c. per lb. of material.
Premium on shipments of 20,000 lbs. or more at one time.	½c. per lb. of material.

TABLE III
Secondary Monel Ingot and Shot and Secondary Copper-Nickel Shot

Grade	Price, cents per lb., f.o.b. point of shipment
Monel ingot	27
Money shot	27
Copper-nickel shot containing 48% to 52% nickel and 52% to 48% copper and not more than ½% foreign materials	25½

The maximum prices in Table III apply if the material is sold, shipped, delivered or carried away, in lots of 30,000 lb. or more; if sold and shipped, delivered or carried away in lots of:

Cents Per Lb. May Be Added to Such Prices

10,000 up to 30,000 lbs.	½
2000 up to 10,000 lbs.	1
1000 up to 2000 lbs.	1½
500 up to 1000 lbs.	2
100 up to 500 lbs.	2½
100 lbs.	3½

TABLE IV—*Nickel Steel Scrap*

Maximum price of steel scrap (for sale to a consumer) containing less than 1 per cent nickel is the price of a like grade of steel scrap as determined under the Iron and Steel Price Schedule No. 4, plus $1 a gross ton for each ¼ of 1 per cent, computed on the basis of the following table:

1% up to 1.25% nickel content	+$4,
1.25% up to 1.50% nickel content	+$5,
1.50% up to 1.75% nickel content	+$6,
1.75% up to 2.00% nickel content	+$7,
2.00% up to 2.25% nickel content	+$8, etc.

Notes: Schedule became effective June 2.

Grades not listed are to be sold at their normal differentials from the listed grades. Grades should meet standards listed in Circular O issued by the National Association of Waste Material Dealers. A manufacturer or fabricator who produces scrap may not qualify for a converters' premium.

Brokers' commissions are allowed as follows (the commission to be added to the maximum price listed herewith: In the case of stainless scrap not more than 5 per cent of the price and with nickel scrap of not more than $1 a gross ton. The commission must be figured, *BEFORE* adding the $10 premium for briquetting.

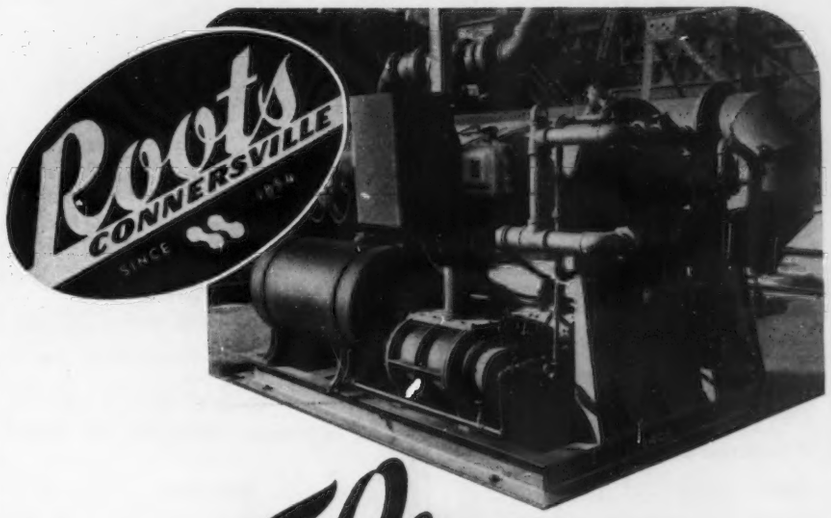
On shipments of chrome-nickel scrap in less than carload lots, the maximum shall be $10 a gross ton less than the listed carload lot price.

A maximum of $10 a gross ton may be added to the maximum prices listed for stainless, chrome-nickel and straight-chrome scrap when in the form of briquettes (not bundles or bales) which are suitable for direct charging into the furnace without further preparation.

TABLE II—*Stainless Steel Scrap*

Grade	Sheets, Clippings and Solids[1]	Turnings and Borings[1]
18% Chrome—8% Nickel Type		
Containing 16%-20% chrome and 7%-10% nickel.	$90 a gross ton.[2]	$60 a gross ton.[2]
All other grades or types of chrome-nickel stainless steel scrap.	28c. per lb. of nickel contained; 9½c. per lb. of chrome contained; no payment for any other metals contained.	$30 a gross ton less than the applicable maximum price for sheets, clippings and solids.[2]
Straight-Chrome Type		
Containing 12%-14% chrome.	$35 a gross ton.	$30 a gross ton.[2]
Containing 14%-18% chrome.	$40 a gross ton.	$35 a gross ton.[2]
Containing over 18% chrome.	$40 a gross ton plus 9½c. per lb. for each lb. of chrome in excess of 18%.[2]	$5 a gross ton less than the applicable maximum price for sheets, clippings and solids.[2]

[1] Price f.o.b. point of shipment. [2] Effective Sept. 8, 1941.



Eliminate
EXPLOSION HAZARDS
THAT THREATEN WAR PRODUCTION

Inert gas, produced by accurately controlled combustion, is the low-cost, *safe* medium for purging your blast furnace mains, Cottrell precipitators, gas tanks, lines, handling equipment and other apparatus. Roots-Connersville Inert Gas Generators also supply controlled atmosphere for treatment of metals.

Simple, accurate, and economical in operation. All delicate and complicated proportioning instruments eliminated.

Installation shown is an oil-fired "R-C" Inert Gas Generator at large steel plant, delivering 15,000 cu.ft. per hour.

ALL OUT for VICTORY

ROOTS-CONNERSVILLE BLOWER CORPORATION
201 Ohio Avenue Connersville, Indiana

NEW YORK CHICAGO POTTSTOWN, PA. SAN FRANCISCO
PITTSBURGH BOSTON DETROIT ST. LOUIS LOS ANGELES

G. A. WELDING Shop Notes

"BODY-STRENGTH OPENINGS"

A pressure vessel can be no stronger than its openings. In G. A. "Fluid-Fusion" Welded Vessels every opening is strongly reinforced. Contour and location are studied for the most efficient design. Only the finest grades of necks and fittings are used. The welding is so skillfully done that it assures extra strength at these important points — manways and nozzles *as strong as the body itself.* G. A. "Fluid-Fusion" Welded Vessels are made exclusively by:

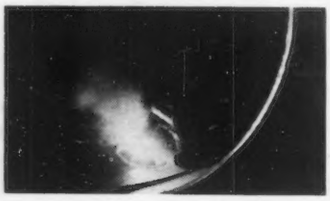


PLATE AND WELDING DIVISION

GENERAL AMERICAN TRANSPORTATION CORPORATION

GATX GENERAL AMERICAN PLATE & WELDING DIVISION PLANT AT SHARON, PA.

Cable Address GENTANWELD Sharon, Pa.

Offices In All Principal Cities

Price Schedule No. 10—Pig Iron

(Dollars per gross ton at various basing points)
(Subject to additional charge for delivery within switching limits of a district)

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phos.
Bethlehem, Pa.	$25.00	$24.50	$26.00	$25.50	....
Everett, Mass.	25.00	24.50	26.00	25.50	....
Swedeland, Pa.	25.00	24.50	26.00	25.50	....
Steelton, Pa.	....	24.50	....	....	$29.50
Birdsboro, Pa.	25.00	24.50	26.00	25.50	29.50
Sparrows Point, Md.	25.00	24.50	....	....	....
Erie, Pa.	24.00	23.50	25.00	24.50	....
Neville Island, Pa.	24.00	23.50	24.50	24.00	....
Sharpsville, Pa.	24.00	23.50	24.50	24.00	....
Buffalo	24.00	23.00	25.00	24.50	29.50
Chicago	24.00	23.50	24.50	24.00	....
Granite City, Ill.	24.00	23.50	24.50	24.00	....
Cleveland	24.00	23.50	24.50	24.00	....
Hamilton, Ohio	24.00	23.50	....	24.00	....
Toledo, Ohio	24.00	23.50	24.50	24.00	....
Youngstown	24.00	23.50	24.50	24.00	....
Detroit	24.00	23.50	24.50	24.00	....
Duluth	24.50	....	25.00	24.50	....
Birmingham	20.38	19.00	25.00	....	....
Provo, Utah	22.00	....	....	....	....

Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and Struthers Iron & Steel Co. are permitted to charge 50c. a ton in excess of above basing point prices for No. 2, basic, bessemer and malleable iron.

High-Silicon, Silvery Iron

(Base Silicon 6.00 per cent to 6.50 per cent)

Jackson County, Ohio	$29.50
Buffalo, New York	30.75

Gray Forge

Valley or Pittsburgh Furnace	$23.50

Charcoal

Lake Superior Furnace	$28.00
Lyles, Tenn., High Phos. Furnace	28.50
Lyles, Tenn., Low Phos. Furnace	33.00

Differentials

Silicon

Base prices subject to an additional charge not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base (1.75 to 2.25 per cent).

Phosphorus

Base prices subject to a reduction of 38c. a ton for phosphorus content of 0.70 per cent and over.

Manganese

Base prices subject to an additional charge not to exceed 50c. a ton for 50 per cent manganese content in excess of 1 per cent.

Notes: Original schedule became effective June 24, 1941.

Delivered prices are determined by the governing base point price plus freight charges and differentials. The governing base is that which results in the lowest delivered price. While no official ruling has yet been issued, it is understood that OPA has adopted the practice, with dislocated tonnages, of permitting the customer to pay the freight, except for $1, which the producer is required to absorb. Dislocated tonnages are movements to districts not normally served by a given furnace.

The export ceiling price is the price at the governing basing point, plus differentials, plus export transportation charges from the basing point to the point of delivery. In the case of exports, the governing base may be the established point, or the nearest place of production.

For special kinds or grades of iron for which there are no differentials, the ceiling prices are the basing point prices and the special differentials which were in effect on June 24, 1941.

Price Schedule No. 12—Brass Mill Scrap

Grade	Price per lb., f.o.b. point of shipment: Heavy Scrap	Rod Ends	Turnings
Brass			
Commercial Bronze			
Containing 95% or more copper	9½c.	9¼c.	8¾c.
Containing minimum of 90% up to 95% copper	9⅜c.	9⅛c.	8⅝c.
Red Brass			
Containing minimum of 80% copper	9⅛c.	8⅞c.	8¾c.
Best Quality Brass			
Containing minimum of 71% up to 80% copper	8¾c.	8½c.	....
			Rod Turnings
Yellow Brass	8⅝c.	8⅜c.	7⅞c.
Copper	10¼c.	10¼c.	9½c.
			Turnings
Nickel Silver			
5% nickel	9¼c.	9c.	4⅝c.
10% nickel	10⅛c.	9⅞c.	5 1/16c.
15% nickel	10⅞c.	10⅝c.	5 1/16c.

(Quantity Differentials)

Premiums on shipments of:	
15,000 lbs. or more at one time	⅝c. per lb.
40,000 lbs. or more at one time	1c. per lb.

Notes: Original schedule became effective July 21, 1941.

Maximum prices are for scrap which is clean, dry and free from foreign materials and which meets accepted maximum standards of the trade. Scrap

TRADE **AUTOMATIC** MARK

Manufacturers for Over Thirty Years

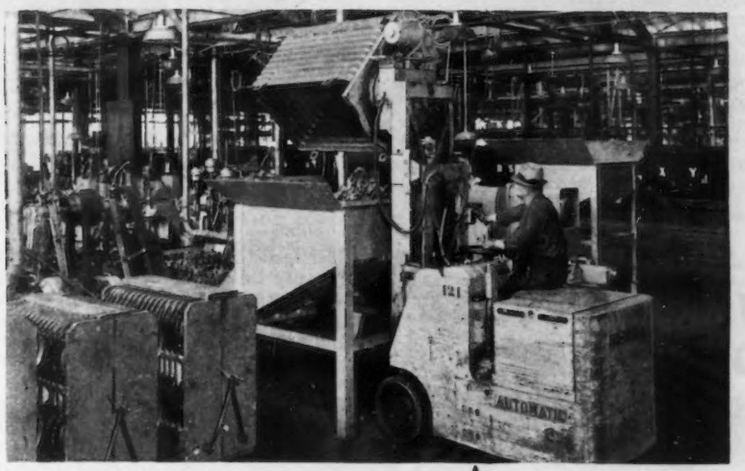
Electric Propelled INDUSTRIAL TRUCKS

FOR ECONOMICAL MATERIALS HANDLING

★ FORK TRUCKS
★ LOW & HIGH LIFT TRUCKS
★ LOAD CARRIERS
★ TRACTORS — CRANES

Capacities 1000 to 60,000 Lbs.

WRITE FOR COMPLETE DETAILS



Model "CHTF" — Light-duty fork truck designed expressly for light unit load operation. Capacities 2000 lbs. Has full telescopic fork lift 120"—Collapsed height 83". Exceptionally compact for box car operation and narrow platform or aisle maneuvering.

☆

Some of the Popular Types

of the "AUTOMATIC" line are illustrated here. They represent but a part of the many "AUTOMATICS" now serving American industry.

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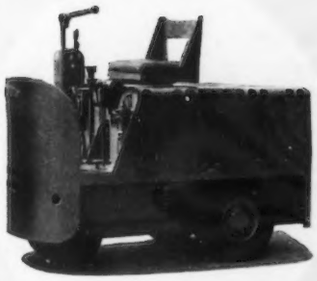


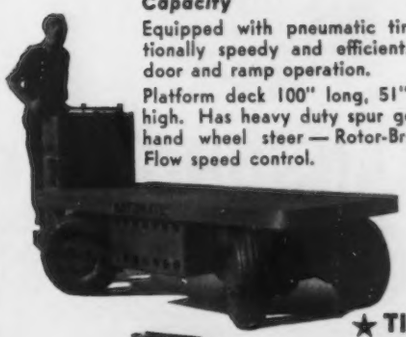
★ LIFTING

Low Lift Type for Skid Transportation

Model "LO-5"—For heavy-duty top-performance and efficiency to handle 10,000-lb. skid loads. Has standard platform 60" long, 26" wide, 11" high with 5" lift. Speed-O-Matic Drive control. Equa-poised drive and Dynatrol lift units.

★ LOADING

Platform Type "EN-2"—4000 lb. Capacity



Equipped with pneumatic tires. Exceptionally speedy and efficient. For outdoor and ramp operation.

Platform deck 100" long, 51" wide, 29' high. Has heavy duty spur gear drive—hand wheel steer — Rotor-Brush Power-Flow speed control.

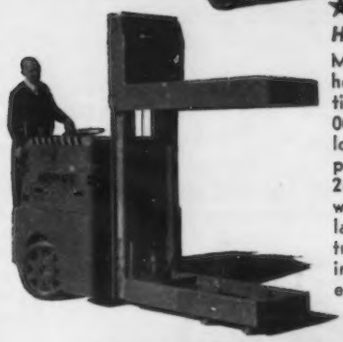
★ HAULING

Model "TNN" Tractor with pneumatic tires. Has powerful spur gear drive, exceptionally compact and easy to maneuver. Rated DBP capacity 485 lbs. normal—2000 lbs. ultimate.

Model "LN-3"—For speedy transportation and placing of 6000-lb. skid loads. Has standard platform 55" long, 27" wide, 10¾" high with 6" lift—Spur gear, drive and lift units—Rotor-Brush control system.

★ TIERING

High Lift Type



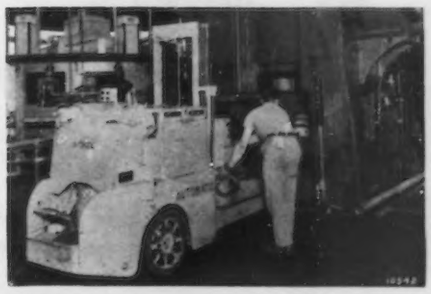
Model "TLO-5" — For heavy duty transportation plus tiering of 10,000-lb. capacity skid loads. Has standard platform 60" long, 26¼" wide, 11" high with 60" lift. The very latest in electrical control — construction styling and performance efficiency.

★ STACKING

Model "THTF-L" — Fork truck offers new opportunities for lowest cost unit load handling and storage on pallets. Capacities 3000 to 7000 lbs. Standard telescopic lift 119"—Collapsed height 83" for box car operation.

★ TIERING

Model "TLN-3" — For 6000-lb. skid loads tiering plus transportation. Has standard platform 55" long, 27" wide, 10¾" high, 60" lift.



AUTOMATIC TRANSPORTATION COMPANY

Division of the Yale & Towne Mfg. Co.

75 W. 87th St. CHICAGO, ILL.

WHEN YOU BUY TRUCKS · · *Buy* "AUTOMATIC"

which fails to meet such standards should be sold at normal differentials below the maximums listed here.

Maximum prices apply on shipments in lots of less than 15,000 lb. Premiums for larger quantities are as listed above. A lot of 15,000 lb. for the purpose of this schedule may be made up of any grade of heavy scrap or of any kind or grade of turnings or rod ends or both.

If delivery is made by truck, a shipment in lots of 15,000 or 40,000 lb. or more as the case may be, will be considered to have been made at "one time" if such lots are delivered to the buyer within two days.

Price Schedule No. 15

Copper

Grade	Price, cents per lb.
Electrolytic, lake, other fire refined copper in wire or ingot bars, delivered Conn. Valley, in carlots.	12c.
Casting copper in wire or ingot bars, made by fire refining to a standard of 99.5% pure, in carlots, f.o.b. refinery	11¾c.

Differentials

For copper of any kind, grade, shape or form, other than those listed above, shall use the differentials (for either adding to or subtracting from the base) which were in effect on Aug. 11, 1941. The same regulations govern in the case of deliveries at points other than Connecticut Valley. For less than carlot shipments, the following premiums are to be added to the Connecticut Valley base (plus such other differentials for form, delivery, etc., as may apply):

Quantity	Per lb.
0—499 lb.	2c.
500—999 lb.	1½c.
1000—4999 lb.	1c.
5000—lb. to carload....	¾c.

The less-than-carlot differentials do not apply to refiner or producer sales. Refiners and producers are permitted to sell less carlots at a delivered price not more than ½c. above the Connecticut Valley base, adjusted for such other differentials as may apply.

Notes: Original schedule was issued Aug. 8. Important amendment issued Sept. 2.

The copper grades listed above must be made to meet ASTM specification B5-27 for electro copper or B4-27 for lake copper.

—The Iron Age—

Price Schedule No. 17

Pig Tin

Grade*	Price, per lb.
A—99.8%	52c.
B—99.75 to 99.79%	51⅝c.
C—Cornish Refined	51⅝c.
D—99 to 99.74%	51⅛c.
E—Below 99%	51c.

*Grade A must meet "Specifications and Proposals for Supplies No. S-14," issued Dec. 15, 1939, by U. S. Treasury, procurement division, except that this grade need not be free of scrap and remelted metal. Grade B includes tin of 99.8 per cent or higher purity but which does not otherwise meet specifications of Grade A. Price for Grade E applies only to tin content of such metal.

Differentials

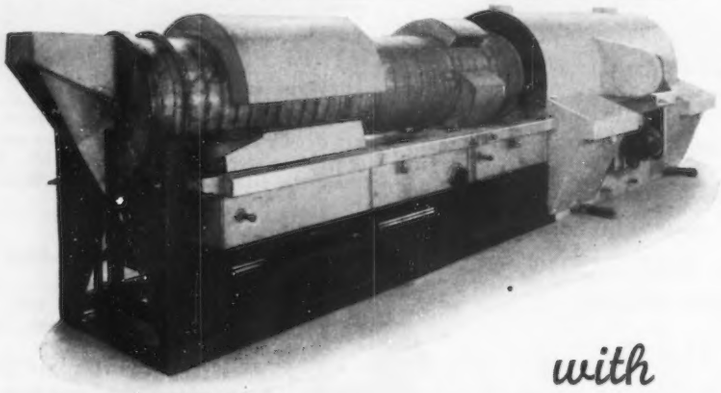
1. For lots of less than 5 tons, the following premiums may be added:—

	Cents per lb.
2240 to 11,199 lb. inclusive	1
1000 to 2239 lb. inclusive	1½
500 to 999 lb. inclusive	2½
Under 500 lb.	3

2. For Freight Rates:—

Above prices are, in the case of foreign pig tin, ex dock or store, Port of New York, and, in the case of domestic pig tin, ex producer's plant. Maximum prices of foreign tin which is imported through ports of entry other than the Port of New York shall be ex dock or store at the actual port of entry and shall be as much more or as much less than the above prices as the ocean freight from the point of shipment to the actual port of entry exceeds or is less than the ocean freight from such point of shipment to the Port of New York. Foreign tin which is physically present at or is

CARTRIDGE FINISHING SPEEDED
for NATIONAL DEFENSE



with

RANSOHOFF EQUIPMENT

After annealing, cartridge components are pickled in the RANSOHOFF Continuous Process Pickling, Rinsing, Hot Neutralizing, Hot Rinsing and Drying Machine which is approximately thirty-one feet long.

The work is carried through the machine by worms welded to the inside of the stainless steel drum. Where the processing is performed, the sections of the drum are solid. These sections are kept filled with acid, water or a neutralizing solution by cups that dip into tanks beneath the drum. The RANSOHOFF patented lock washer and dam head maintain the proper liquid level in each processing section. Drain pans under the perforated draining sections carry the liquids back to their respective tanks.

The work is dried by heated air blown through holes in a pipe extending through the center of the drum. The air is gas heated by means of a stainless steel heat exchanger which prevents tarnishing. The drying air is circulated by a centrifugal blower and is partially drawn fresh and partially re-circulated.

Write Dept. "I" for this Catalog

N. RANSOHOFF, Inc.
TOWNSHIP AND BIG FOUR R. R.
CINCINNATI, OHIO

AVAILABLE FOR PROMPT DELIVERY

With production schedules constantly endangered by non-delivery of essential materials, the elimination of even one such problem is a valuable aid in maintaining maximum output. Torrington Needle Bearings are available for *prompt* shipment on your priority orders!

Right from the start, steadily rising sales curves reflected industry's immediate recognition of the Needle Bearing's advantages. Long before defense requirements brought increasing demands for most industrial materials, Torrington was prompted to expand production capacity again and again, to anticipate growing use of the Needle Bearing. So broad was the scope of this expansion program, initiated in the light of the Bearing's demonstrated potentialities in normal times and its acceptance by so many of the country's leading engineers, that it has proved sufficiently flexible to care for the abnormal requirements of the present.

Manufacturers of aircraft, automotive equipment, textile machinery, farm implements, electrical apparatus, and many other products have put the Needle Bearing to work in thousands of applications, because of such conspicuous features as low cost, small size, high capacity, ease of installation, efficient lubrication. And today the Needle Bearing has a new and even more important appeal—its ready availability to the makers of defense equipment and machines.

You can avoid delays by incorporating the Needle Bearing in your designs *now*—and you can profit as well by its adaptability to the solution of a wide range of bearing problems. Torrington engineers will be glad to work with you in incorporating the advantages of the Needle Bearing in your product. For full details on this unusual bearing, write for Catalog No. 104.

THE TORRINGTON COMPANY
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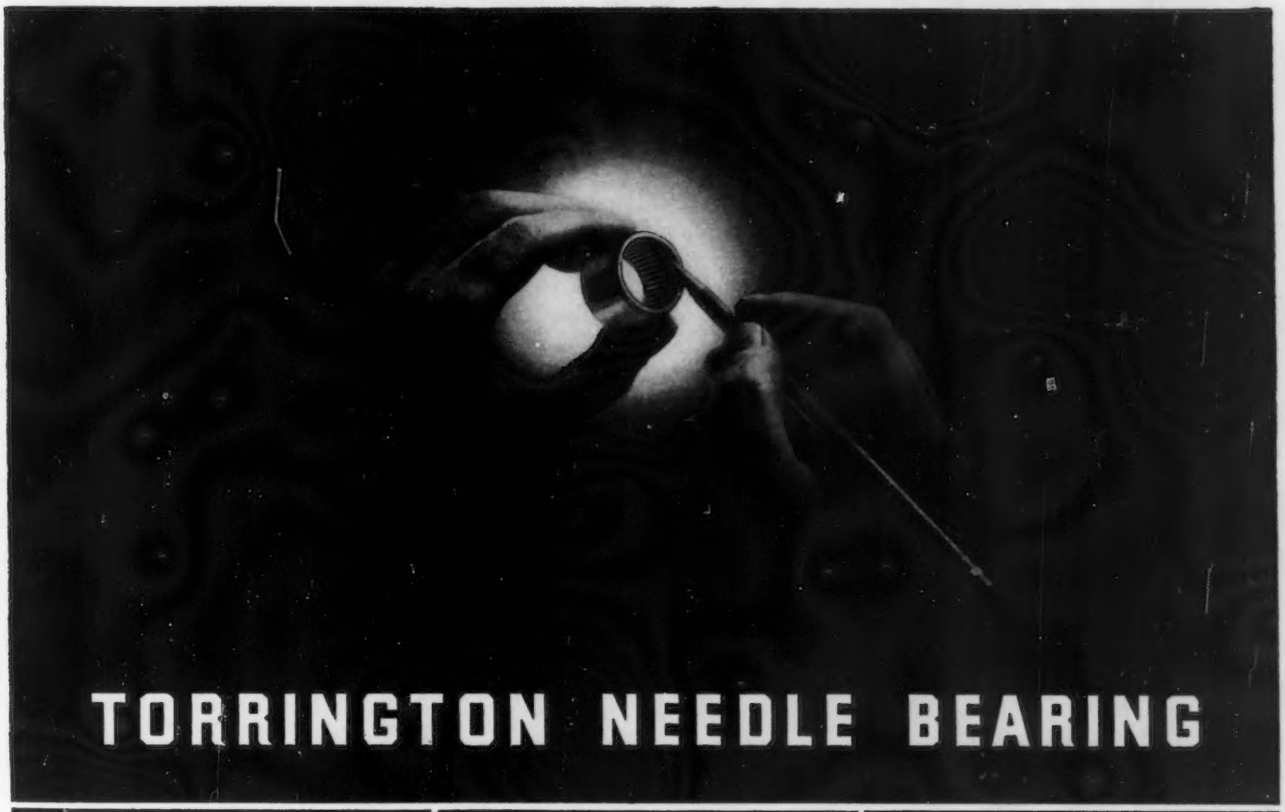
Makers of Needle and Ball Bearings
New York Boston Philadelphia Detroit
Cleveland Chicago Los Angeles Seattle
San Francisco Toronto London, England



TORRINGTON NEEDLE BEARING

REDUCTION IN WEIGHT

and availability when needed are among the outstanding reasons for the use of Needle Bearings in many aircraft applications. A typical instance is its use on the cowl flap control rod of P-40 pursuit planes built by Curtiss-Wright Corporation.

CURTISS—WRIGHT

COMPLETE RELIABILITY

is essential in such materials handling equipment as the Towmotor Lift Truck, which is subjected to severe service and heavy loads. Towmotor assures reliable bearing performance by using Needle Bearings on steering axle and hydraulic lifting cylinder crosshead.

TOWMOTOR LIFT TRUCK

HIGH CAPACITY IN SMALL SPACE

is obtained by the use of Torrington Needle Bearings on the rocker shaft of Class 2600 Governors built by The Pickering Governor Company. Compactness of the Needle Bearing contributes to simplification in product design and to accurate governor operation.

PICKERING GOVERNOR

sold for shipment from a point other than the port at which it was entered, and domestic pig tin which is physically present at or is sold for shipment from a point other than the producer's plant, may be sold at prices, f. o. b. such point of physical presence or of shipment, which exceed the above maximum prices by no more than the domestic shipping charges which have actually been paid or must be paid in order to transport such pig tin to such point of physical presence or of shipment.

Note: Original schedule issued Aug. 14, amended Sept. 19.

Price Schedule No. 20

Copper Scrap

Grade	Price per lb., f.o.b. point of shipment
No. 1 copper wire	10c.
No. 1 heavy copper	10c.
No. 2 copper wire (containing 96% copper)	9c.
Mixed heavy copper (containing 96% copper)	9c.
Light copper (containing 92% copper)	8c.

If the copper content of No. 2 wire or mixed heavy scrap is more or less than 96 per cent, or if the copper content of light scrap is more or less than 92 per cent, the price per lb. shall be increased or decreased at the rate of 0.11775c. for each 1 per cent variation in the copper content with proportionate adjustments for variations of less than 1 per cent.

Prices may be quoted or material invoiced on a delivered price basis. However, if prices are so quoted or material is so invoiced, and the total delivered price exceeds the maximum price fixed by this schedule then (1) the delivery charge shall be shown as a separate item, (2) the price f.o.b. point of shipment (calculated by subtracting the delivery charge from the total delivered price) shall not exceed the maximum price set forth in this schedule and (3) the delivery charge shall not exceed the lowest commercial rate for the most nearly comparable service.

Premiums

(Either one, but not both, the following premiums may be added to above maximum prices.)

Grade	Premium, per lb.
Scrap in crucible shape*	1¼c.
Shipments of 40,000 lb. or more at one time**	½c.

*This includes briquetted No. 1 wire whose measurements do not exceed 16x10x12 in. Wire must be clean, untinned, of 16 B&S gage or larger, free from burnt, brittle wire and other foreign substances.

**A shipment may be made up of any kind or kinds of scrap listed in this schedule. If delivery is made by truck, a shipment at "one time" may include all shipments made to a buyer within 48 consecutive hours.

Special-Purpose Scrap

Copper wire especially selected and prepared for the use of producers of copper sulphate or of other chemicals, copper segments used by makers of copper powder, or any copper scrap prepared for the special use of steel mills, iron foundries, aluminum smelters or any other special user except producers of copper, brass or bronze castings may upon application be granted a special premium above the maximum prices fixed by this schedule. This premium shall be granted only (1) if the specified material has normally commanded such a premium because of its special uniformity, purity, or preparation, (2) if the material is sold to the type of user for whom it has been especially prepared and (3) if the sale to the specific user has been approved by the OPA.

Notes:

Schedule originally issued Aug. 18, but revised several times since. Data above are from the revised schedule which became effective Oct. 10, 1941.

Maximums listed in this schedule are applicable only to scrap meeting the standards for such grades generally accepted in the trade, as for example the standards set forth in the Standard Classification for Old Metals, Circular O, National Association of Waste Material Dealers, Inc. Scrap failing to meet these standards should be sold at less than the applicable maximum. Scrap which is a by-product of fabricating copper sheet, tube, rod, or other brass mill products, are not covered by this schedule, but by Schedule No. 12.

ATTENTION

Manufacturers with defense contracts

Manufacturers already in production on defense contracts are using Wyandotte Metal Cleaners especially adapted to their many problems.

Investigate our Special Cleaners—

1. For cleaning pistons, crankshafts, camshafts, valve stems, rings, etc., prior to Lubrite Process of Parker-Rustproof Company.
2. For cleaning brass cartridge cases, all sizes, after drawing and machining.
3. For cleaning steel projectiles, all sizes, after machining and prior to painting and lacquering.
4. For cleaning bomb bodies prior to painting and lacquering.
5. For cleaning bomb fins, fin assemblies, and similar steel stampings prior to painting or lacquering.
6. For cleaning fuses and fuse bodies (aluminum or brass) after machining.
7. For cleaning steel fuse parts and boosters prior to cadmium plating.
8. For process cleaning of airplane motor parts (aluminum and magnesium).
9. For cleaning before heat treating.
10. For cleaning quenching oils after heat treating.
11. For cleaning sheet and cast aluminum prior to anodizing.

There is a Wyandotte Cleaner for any metal-cleaning problem and for use in all types of equipment.

Wyandotte PRODUCTS
Service Representatives in 88 cities

THE J. B. FORD SALES COMPANY • WYANDOTTE, MICHIGAN

ARMSTRONG

TOOL HOLDERS and TOOLS

ARMSTRONG TOOL HOLDERS
—for Lathes, Planers, Slotters, Shapers

TURRET LATHE and SCREW MACHINE TOOLS

BITS, BLADES, CUTTERS and HIGH SPEED STEEL

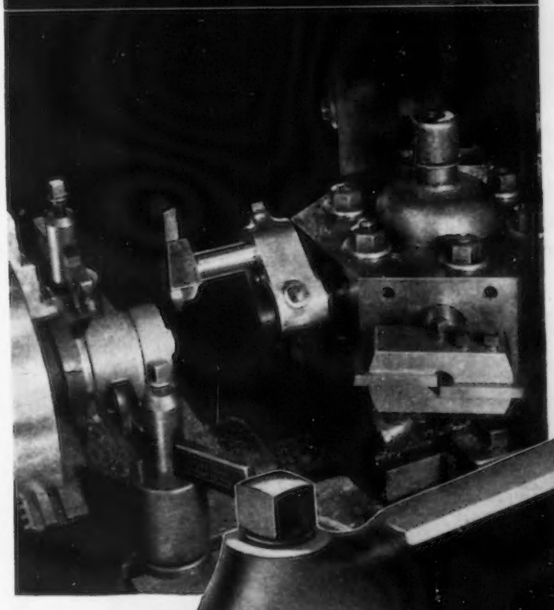
LATHE and MILLING MACHINE DOGS
—Drop Forged

"C" CLAMPS
—Drop Forged

RATCHET DRILLS

WRENCHES
—Open End and Socket

MACHINE SHOP SPECIALTIES



ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
309 N. Francisco Ave., Chicago, U.S.A.
Eastern Sales Office: 199 Lafayette St., N.Y.

Price Schedule No. 21

Formaldehyde

Method of shipping, and quantity	Maximum price, cents per lb.* Carload lots	Less than carload lots
Tank cars (70,000-72,000 lbs.)	.0425	....
Tank truck or wagon	....	.0450
Drums (475 lbs.)	.0540	.0590
Barrels (450 lbs.)	.0575	.0625
Kegs (225 lbs.)	.0675	.0725
Half barrels (225 lbs.)	.0675	.0725
Barrels (200 lbs.)	....	.0725
Keg (125 lbs.)	.0700	.0750
Carboys (100 lbs.)	.0600	.0650
Kegs (90 lbs.)	.0750	.0800
Kegs (60 lbs.)	.0800	.0850
Carboys (45 lbs.)	.0700	.0750
Drums (45 lbs.)	....	.0850
Kegs (45 lbs.)	.0900	.0950

*Applies on shipments from producers' shipping points, and is quoted f.o.b. New York, West Haverstraw, N. Y., Garfield or Perth Amboy, N. J., or Tallant, Okla., freight equalized.

Delivery from Local Stocks

Maximum prices for material delivered from local stocks maintained at points other than producers' shipping points are not to exceed a price ex seller's warehouse greater than the maximums listed above, plus freight from the listed shipping points (the lowest point controlling), plus an extra of 1c. a lb.

Notes:

Schedule became effective Aug. 20, 1941. Formaldehyde is described as (1) USP solution of formaldehyde, 37 per cent by weight, or (2) any other solution of formaldehyde except lots or quantities sold for commercial use as embalming fluids.

Prices of containers of quantities of material sold in containers holding 45 lb. or more, but not listed above, are not to exceed the maximum listed price for the container holding the next largest quantity. All persons making purchases in containers of 45 lb. or more must keep detailed records.

—The Iron Age—

Price Schedule No. 29

Coke

By-Product Foundry Coke

TABLE I

Oven Plant	F.O.B. Price in Cars per net ton
Alabama	$8.50
Chicago	11.50
Ashland, Ky.	10.00
Detroit	11.75
Kearny, N. J.	12.15
Buffalo	11.75
Ironton, Ohio	10.00
Painesville, Ohio	11.25
Portsmouth, Ohio	10.00
Erie, Pa.	11.75
Philadelphia	11.75
Chattanooga, Tenn.	9.00
Fairmont, W. Va.	10.00
Milwaukee	12.25

TABLE II

Maximum Delivered Prices Within Switching Districts

District	Delivered Price
Chicago	$12.25
St. Louis, Mo., and East St. Louis, Ill.	12.02
Indianapolis	12.00
Terre Haute, Ind.	12.00
Detroit	12.25
Buffalo	12.50
Cincinnati	11.75
Cleveland	12.30
Erie, Pa.	12.25
Philadelphia	12.38
St. Paul and Minneapolis	14.00

TABLE III

New England Area

Maximum delivered price in the states of Connecticut, Rhode Island, Massachusetts, New Hampshire, Vermont, Maine and in the adjoining areas of New York which have customarily been included within the New England shipping area, shall be $13.75 per net ton, less $0.15 per ton discount for cash ten days.

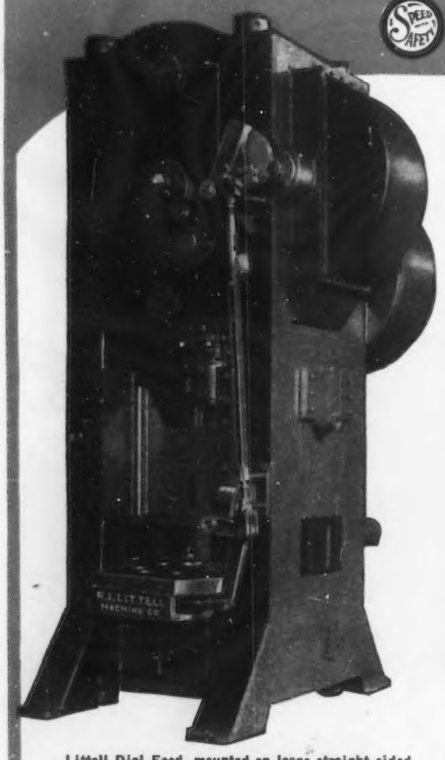
Shipments to West Coast

On shipments to the states of California, Oregon and Washington, the governing oven plant may be Chicago, provided that when shipment is from the oven plants listed in Table I, the maximum delivered price may not exceed the f.o.b. oven plant price at such

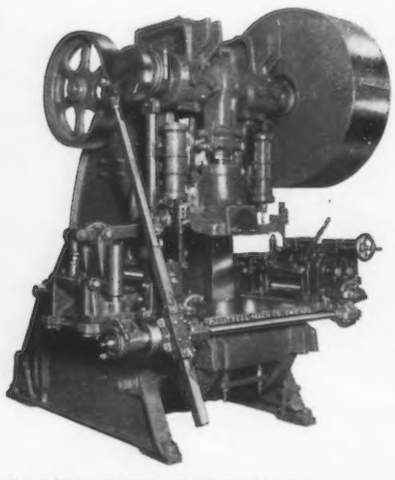
LITTELL for Faster Defense Production

Top speed in National Defense production can be secured with Littell Roll and Dial Feeds, used by leading concerns for increasing output 200 to 300 percent.

Littell pressroom equipment includes—Reels for coil stock, Roll and Dial Feeds, and Feeding and Straightening Machines. REQUEST BULLETINS.

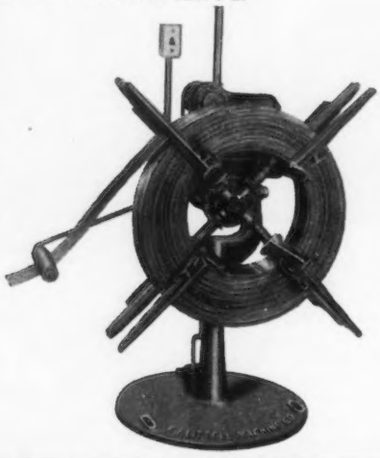


Littell Dial Feed, mounted on large straight-sided press, for producing cartridge cases. Dial Feeds of this type, used in cartridge case manufacture, perform the following operations: 1st, 2nd and 3rd draw, heading and indenting, piercing and tapering.
REQUEST BULLETIN SEC. 31.



No. 6-12½ Littell Double-Rack and Pinion Roll Feed with Power-Driven Straightener and Scrap Cutter, for blanking and drawing small shells. Mounted on large open-back inclinable press. Feed length, 0 to 15". Feed rolls, 6¼" dia. x 12½" long.
REQUEST BULLETIN NO. 1-B.

No. 3-G Littell Patented Motor-Driven Automatic Centering Reel and Scrap Winder, for unreeling material to automatic presses. Capacity, 300 lbs., 6½" wide.
REQUEST BULLETIN SEC. 5-E.



F. J. LITTELL MACHINE CO.
4151 RAVENSWOOD AVE., CHICAGO, ILL.

In war or peace, Dieing Machines provide BASIC PRODUCTION ADVANTAGES

Firms equipped with Dieing Machines will "have the edge" when production one day goes back to a peace-time basis, just as today they are turning out ordnance stampings on an unequalled standard of high production and high precision.

8 operations performed at every stroke produce 4800 completed shells per hour from .050" steel with 1⅜" draw.

Belt link for Vickers type machine gun, produced complete one per stroke, 140 per minute.

Airplane strut seat of .031" brass produced complete one per stroke, 140 per minute.

Airplane fuselage hinge of duralumin produced complete per stroke in continuous strip including broaching.

Another of the numerous machine gun belt links produced from flat material complete per stroke to precision limits.

Cartridge clip for caliber .303 rifle, produced complete one per stroke, 120 per minute.

50-TON DIEING MACHINE

Dieing Machines produce 1 to 20 completed parts per stroke at speeds up to 600 s.p.m.

Precision of product within .0002" limits when required.

Precision alignment increase life of dies 600% to 900%.

Capacities: 10 tons to 300 tons.

REQUEST CATALOG 41

Intricate stampings COMPLETE PER STROKE

The fact that Dieing Machines are now producing so many different munitions and airplane items, serves to emphasize their VERSATILITY. As readily as they have turned from ordinary industrial work to munitions—at savings often as high as 90%—so they assure the user equal savings on whatever type of stampnigs he may need to shift to in the future. The Dieing Machine is unique. Due to Indirect Underdrive and Precision-guiding, as well as other features, it provides an unequalled combination of high production and high precision. Flat material is converted into intricate parts COMPLETE PER STROKE, with precision of product inside .0002" limits when required. Operations on a single item produced complete per stroke, may involve blanking, piercing, forming, drawing, broaching, extruding and coining. Numerous screw machine products are now made on Dieing Machines at a fraction of former cost. For today's military needs, and for tomorrow's needs whatever they may be, Dieing Machines offer unique stamping advantages!

THE HENRY & WRIGHT MFG. CO.
451 WINDSOR ST., HARTFORD, CONN.

HENRY & WRIGHT DIEING MACHINES

oven plants plus transportation charges.

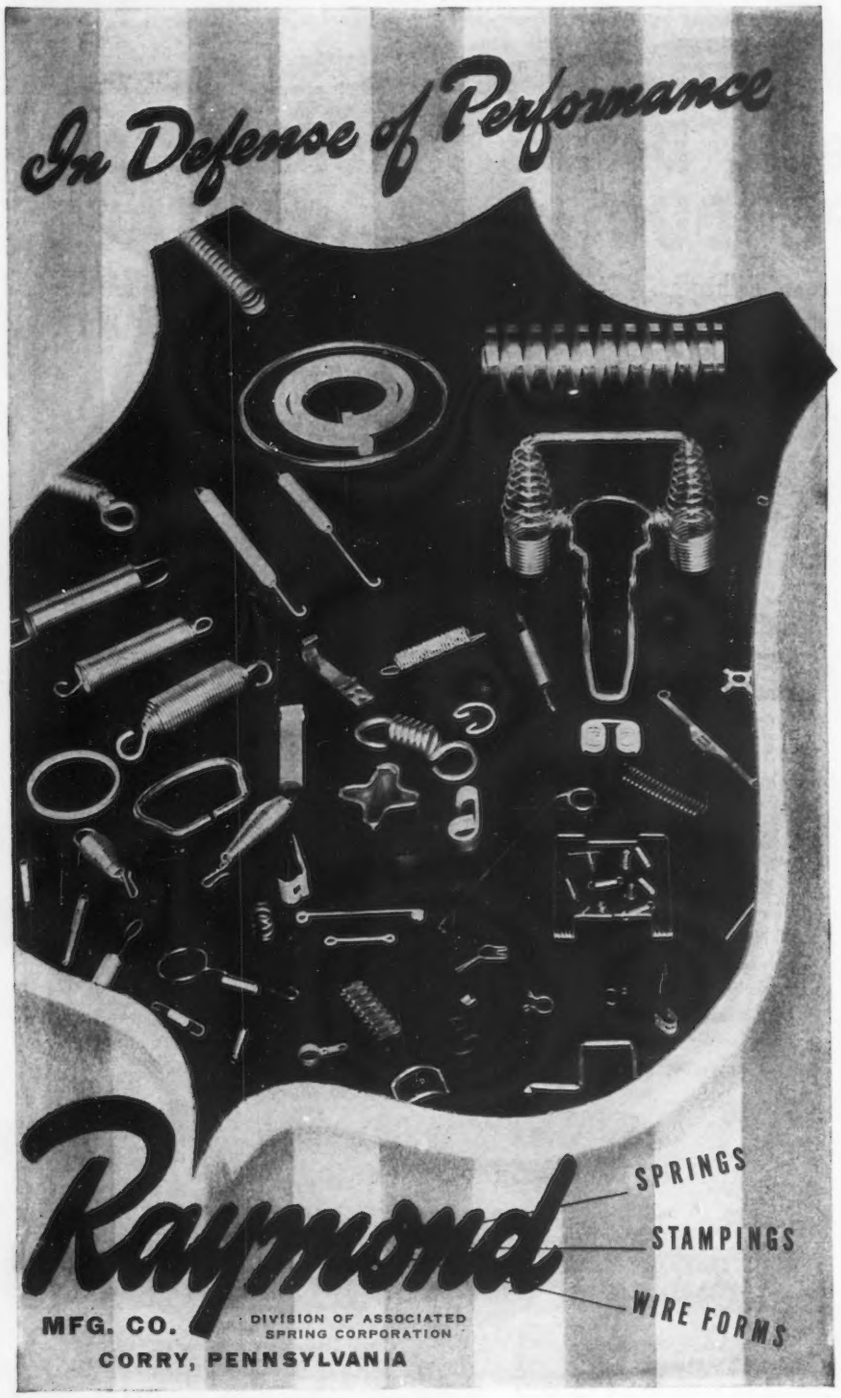
Shipments from Swedeland

Whenever shipment is from Swedeland, Pa., the maximum delivered price shall be the price provided in Table I or the price listed below, whichever is lower, except when prices listed under NEW ENGLAND or WEST COAST are applicable.

When the railroad freight rate for by-product foundry coke from Swedeland to the place of delivery, including switching charges, is:

Freight Rate Per Net Ton	The Maximum Price Per Net Ton Shall Be Delivered
$0.68 and less	$12.38 "
$0.69 to $0.96 inclusive	12.40 "
$0.97 to $1.66 inclusive	12.45 "
$1.67 to $2.24 inclusive	12.70 "
$2.25 to $2.50 inclusive	12.80 "
$2.51 to $2.85 inclusive	12.95 "
$2.86 and over	10.35* "

*F.O.B. Oven Plant, except that on deliveries to be made in the Cumberland valley and central Pennsylvania, the price shall be $10 per net ton, f.o.b. oven plant.



Furnace Coke

The maximum price, f.o.b. oven, on by-product furnace coke, shall be 75c. per net ton above the weighted average price, f.o.b. oven, at which deliveries were made during the first quarter of 1941. The weighted average price means the average of the prices for which by-product furnace coke was sold during the first three months of 1941, weighted by the tons sold at each price. This, however, does not apply to sales made at less than $6 a net ton, f.o.b. furnace, made after issuance of this schedule.

Notes: Schedule became effective Oct. 1, 1941.

Maximum price for by-product foundry coke is the price f.o.b. cars at the governing oven plant (Table I), plus rail transportation and switching charges from that oven to the point of delivery, except in cases listed in Table II and Table III. The governing oven plant is the one which, in terms of its f.o.b. price and transportation charges, provides the lowest delivered price. Prices in excess of the ceilings may be charged under certain conditions. To meet these conditions (1) a seller must have received from a specified foundry a price in excess of the ceilings during the six months ended Sept. 15 and (2) must file with OPA on or before Sept. 27 a list of foundries to which the exception applies together with the prices at which past sales were made. When delivery is by other than railroad, the maximum delivered price shall be adjusted to provide the customary differential or charge in effect Sept. 18 for such delivery.

—The Iron Age—

Price Schedule No. 28

Ethyl Alcohol

Eastern Tank Car Prices

Formulae	*Maximum price, cents per gal.
CD12, f.o.b. shipping point	.325
CD13, f.o.b. shipping point	.325
CD14, f.o.b. shipping point	.325
SDI, at works	.275
SD2B, at works	.245
SD3A, at works	.275
SD12A, at works	.255
SD23A, at works	.275
SD23G, at works	.305
SD23H, at works	.280
Proprietary name CDA, f.o.b. shipping point	.325
Proprietary name solvent, at works.	.285

*Tank cars, Eastern territory, 188-190 proof unless otherwise indicated.

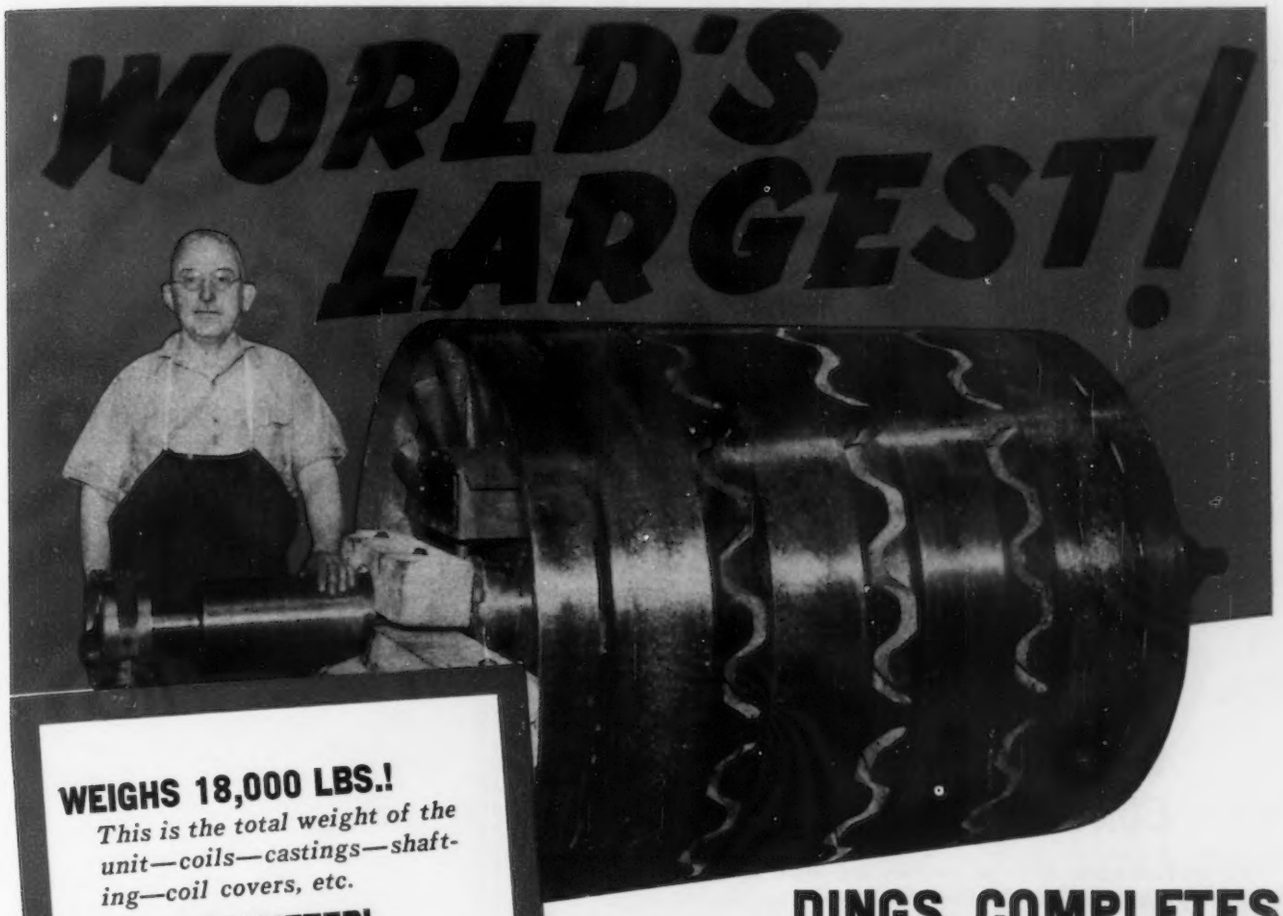
Less-than-Tank Carlots

Differentials below may be added to maximums listed above, containers included, for less-than-tank car lots.

Drums CL	$.07
19 Drums—LCL	.09½
1-18 Drums	.12½
Barrels CL	.11
19 Barrels	.18
1-18 Barrels	.16

Pacific Prices

For maximum prices in the Pacific territory add 4c. per gal. to above



WEIGHS 18,000 LBS.!
This is the total weight of the unit—coils—castings—shafting—coil covers, etc.

4 FT. IN DIAMETER!
48" diameter x 63" across face!

5900 LBS. MAGNET WIRE!
Enough copper wire to reach from Milwaukee to Chicago!

1800 LBS. BRONZE!
Bronze coil covers and end rings instead of steel—eliminate short-circuiting of lines of force — mean greater power.

AIR-COOLED!
Serrated design incorporates radial and longitudinal ducts to provide maximum air circulation for cool, efficient operation.

Dings MAGNETIC SEPARATION

DINGS COMPLETES BIGGEST MAGNETIC PULLEY EVER BUILT!

"IF it's a job for magnetic separation, it's a job for Dings!" This slogan is strengthened by Dings latest engineering achievement in overcoming the problems involved in building the largest magnetic pulley in the world. You may not require separators of such size, but when you buy from Dings you know you are buying from an organization with the experience and ability to handle the toughest jobs.

For purification, concentration, separation—removing chunks of tramp iron or the most feebly magnetic iron compounds from dry materials or liquids—you'll find a Dings High Intensity Separator for the job. Write today.

DINGS MAGNETIC SEPARATOR CO.
516 E. Smith Street • Milwaukee, Wisc.

SEPARATION HEADQUARTERS SINCE 1899

schedules (both schedules if applicable).

Anhydrous Alcohol

For maximum prices of anhydrous ethyl alcohol (200 proof), 3c. a gal. may be added to one or all the schedules listed above, as the case may require.

Notes:

Schedule became effective Sept. 15, 1941. Eastern territory is described as all states east of and including New Mexico, Colorado, Wyoming and Montana. Ethyl alcohol means any ethyl alcohol listed in this schedule and specified or registered with the United States Treasury Department, Bureau of Internal Revenue. Monthly reports must be made by all manufacturers with sales of 500 gal. or more when packaged in containers of 50 gal. or greater.

R-S Oil, Gas and Electric Furnaces Meet the Entire Range of Heat Processing Requirements

ALL-OUT DEFENSE

TOP CAPACITY
CONSTANT UNIFORMITY
CONTINUOUS OPERATION

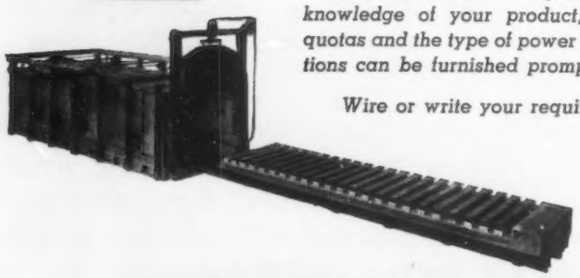
For the heat treatment of all the tools and implements of war, from cartridge cases, shells, demolition bombs and guns, to parts for airplanes, motor cars, tanks and ships, there is an R-S Furnace designed to assist in the goal of the Nation—peak war production.

These modern furnaces vary greatly in size and design from small batch furnaces to those of the car hearth type with capacities of 100 tons per charge. There is one similarity, however. In operation, all show the benefit of wide experience coupled with a thorough knowledge of modern developments in automatic control of both temperature and mechanical apparatus, temperature distribution, heat resistance and transfer, reduction of scaling and decarburization, together with improved methods of material handling. Such experience assures overall low production costs.

PROMPT DELIVERY

Early delivery is facilitated by the possession of a wide range of designs for furnaces already in production or operation. With a knowledge of your product, production quotas and the type of power used, quotations can be furnished promptly.

Wire or write your requirements.



R-S PRODUCTS CORPORATION
4524 Germantown Ave., Phila., Pa.

R-S FURNACES OF DISTINCTION

Price Schedule No. 31

Acetic Acid

Table I
In Tank Carlots

Grade	Price, per 100 lb., delivered
Wood origin	$7.25
Other origin	6.25

Prices in Table I are for glacial acetic acid (99.5 per cent or over), and for weaker grades of commercial types in terms of 100 per cent acid content. Freight in excess of 32c. per 100 lb. may be charged to buyer.

Table II
In Containers, Carlots

Grade	Price, per 100 lb.
Technical*	
28%	$3.18
56%	5.18
70%	6.19
80%	6.91
84%	7.20
Glacial	8.45
Pure*	
30%	$4.23
36%	4.61
60%	7.17
90%	8.70
U. S. Pharmacopoeia	10.25
Chemically pure	13.50

*Specifically designated percentages include all approximations thereof.

Maximum prices, for carload quantities, in carboys and cases, are determined by adding a differential of 50c. per 100 lb. to the maximum prices established in Table II.

Table III
In Containers, Less Than Carlots

Maximum prices for less than carload quantities, in the containers listed below, are determined by adding the following differentials to the maximum prices established in Table II. For barrels or drums, 25c. per 100 lb. For carboys and cases, 75c. per 100 lb.

Prices in Table II are quoted f.o.b. producers' shipping points for concentrations of technical and pure acetic acid of any origin for carload quantities in barrels or drums.

Notes:

Schedule became effective Sept. 29, 1941, and covers all persons buying or selling 3000 lb. or more. All buyers or sellers of this quantity or over must keep detailed information available concerning sales and purchases and all sellers must file monthly reports.

—The Iron Age—

Price Schedule No. 34

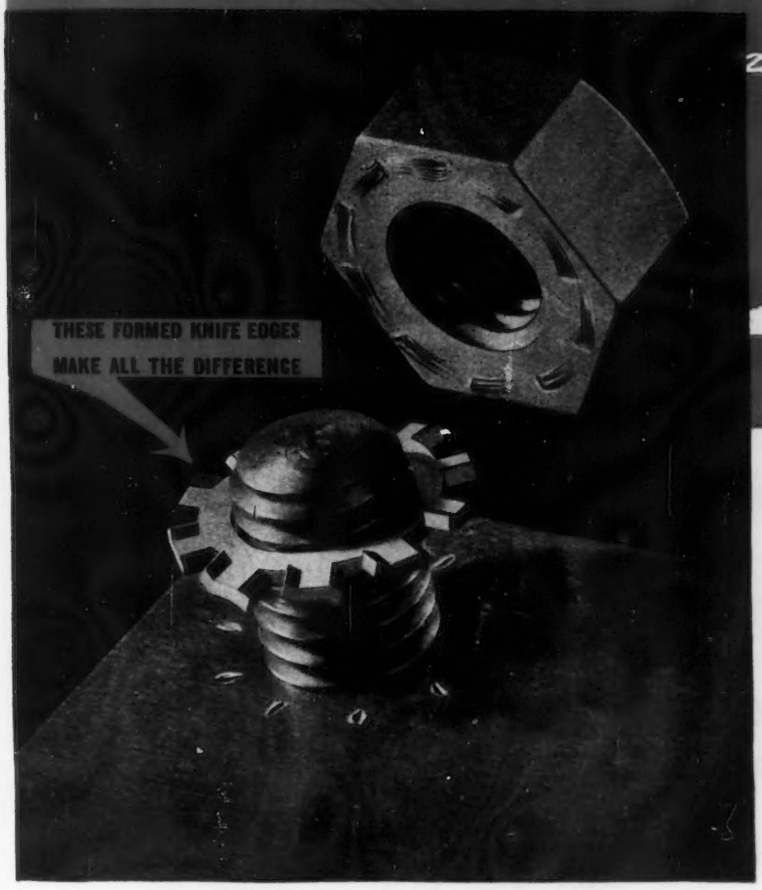
Wood Alcohol

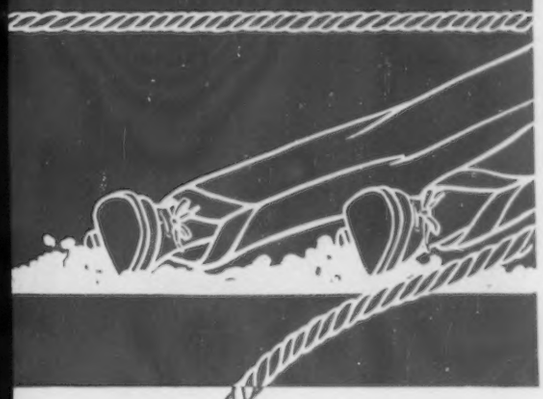
Tank Cars, East of Mississippi River

	Price, per gal., delivered
Denaturing grade	60c.
Pure methyl alcohol	60c.
*95 per cent methyl alcohol	60c.
*97 per cent methyl alcohol	60c.

*Specifically designated.

equal to the TUG OF WAR



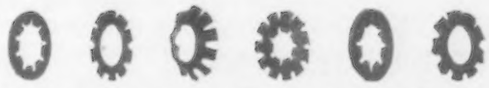


As the chisel edges of EverLOCK washers dig in, to resist the tugs and pulls of vibration or shock, your product proves itself equal to the severest tests. Today, particularly, few manufacturers can foresee exactly how severe the conditions to be met will be. Soundest policy is to bolt or screw every assembly to be ready for the worst.

With EverLOCK washers this is easy and economical — and represents a higher standard of manufacture at no greater cost. The difference is chiefly in the washer design which gives several times more area of resistance (see illustration) with this tooth type washer than with others. The principle is that used by a man who, in a tug of war, braces the whole side of each foot against the earth rather than his heel alone.

Get the handy catalog which shows the whole line at a glance. Just write for it and for an EverLOCK demonstration on your product.

SIX STANDARD TYPES
IN 91 SIZES



FOR MOST APPLICATIONS

Ever LOCK WASHERS

OVER 100 SIZES AND TYPES FOR SPECIAL APPLICATION

THOMPSON-BREMER & CO., 1640 W. HUBBARD ST., CHICAGO, ILL.

Tank Cars, West of Mississippi River

Maximum prices for tank car quantities in territory west of the Mississippi River are determined by adding 3c. per gal. to the maximum prices established above for tank cars in territory east of the Mississippi River.

Drums and Other Containers, Carload Quantities

Maximum prices for drums and other containers, in carload quantities, in territory east or west of the Mississippi River, are determined by adding 6c. per gal. to the maximum prices established for tank cars in the respective territory.

Drums and Other Containers, Less Than Carload Quantities

Maximum prices for drums and other containers, in less than carload quantities, in territory east or west of the Mississippi River, are determined by adding 16c. per gal. to the maximum price established for tank cars in the respective territory.

Notes:

Schedule became effective Oct. 10, 1941, and affects persons buying, selling or transferring quantities of 50 gal. or more. Detailed reports must be kept for one year and sellers of 50 gal. or more must file monthly reports.

—The Iron Age—

Price Schedule No. 36

Acetone

Eastern Prices

Tank cars .....7c. lb. delivered
Drums, carlots
8½c. lb. delivered, containers included
Drums, less than carlots
9c. lb. delivered, containers included
Eastern territory means the states of New Mexico, Colorado, Wyoming and Montana and all territory east of these states.

Western Prices

Prices for the western territory (meaning all states not under the definiton of eastern states above) are determined by adding ½c. lb. to eastern prices.

Notes:

Schedule became effective Oct. 27, 1941, and affects all persons buying or selling acetone in containers of 50 gal. or more. In addition to the usual requirement that detailed data be available for study at all times, the order directs that all producers, except those producing acetone synthetically, submit monthly reports giving a breakdown of production by sources. In addition to above report, all sellers must submit a monthly form detailing all sales in containers of 50 gal. or more. Acetone is taken to mean chemically pure acetone.

—The Iron Age—

Price Schedule No. 37

Normal Butyl Alcohol

Eastern Prices

	Per lb., delivered
Tank cars	10¾c.
Drums, carlots (containers included)	11¾c.
Drums, less than carlots (containers included)	12¼c.

Eastern territory means the states of New Mexico, Wyoming, Colorado, Montana and all states east of these states.

Western Prices

Maximum prices for the western territory (meaning all states other than those coming under description of eastern states above) are determined by adding ½c. a lb. to eastern prices.

Notes:

Schedule became effective Oct. 27, 1941, and covers all persons buying or selling 50 gal. or more. Producers, except those making the material synthetically, are required to file monthly reports giving a breakdown of output by sources and in addition all sellers of 50 gal. or more must file monthly statements of compliance. Buyers and sellers must keep records of all transactions for a period of not less than one year.

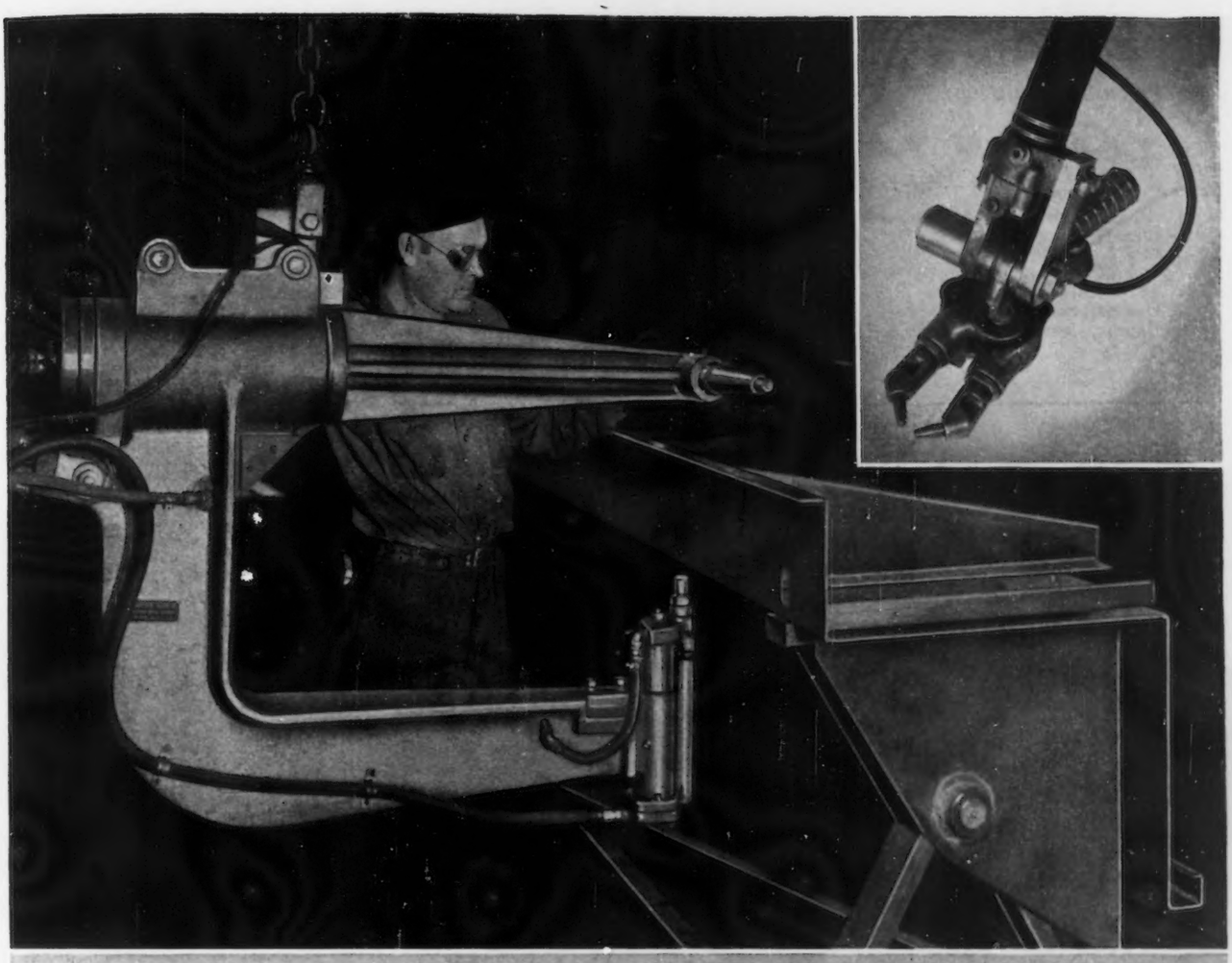
PITTSBURGH STEEL FOUNDRY Corporation

MANUFACTURERS OF

Rough and Machined CARBON and ALLOY STEEL CASTINGS from 10 pounds to 50 tons, also assembled units.

INGOT MOLD CARS
SPINDLES
PINION CASTINGS
LOCOMOTIVE CASTINGS
GEAR CASTINGS
CHARGING BOXES
COUPLING BOXES
ANNEALING BOXES
ANNEALING BOTTOMS
ANNEALING POTS
STEEL ROLLS
ALLOY STEEL ROLLS
BLAST FURNACE BELLS
ROLL HOUSINGS
CHARGING BOX CARS
BLAST FURNACE HOPPERS
CINDER LADLES
SLAG LADLES
COPPER LADLES
MACHINERY CASTINGS
FREIGHT CAR TRUCK SIDE FRAMES
FREIGHT CAR TRUCK BOLSTERS
FREIGHT CAR MISCELLANEOUS CASTINGS
PITALOY "X" (ALLOY) CASTINGS

GLASSPORT, PA.



GUNS *behind the lines*

Guns to build planes—guns to build plants—guns for tanks and trucks—guns for the myriad of items needed for national defense from ammunition boxes to soup kitchens.

To see that resistance welding guns—the "guns behind the lines" are available for whatever purpose they may be needed: to speed production, to simplify manufacture, to cut costs—and as fast as needed—is Progressive Welder's business.

ILLUSTRATED ABOVE

o

Swivel construction of the upper electrode in this Standard Progressive "C" type gun enables clearing of obstructions in welding formed steel sections. (Available with long or short throats, without swivel feature, etc.) Insert shows a standard Progressive gun for lighter work—featuring self-locking full swiveling action, single pin cable clamp and P-H flexible kickless welding cable. There are several hundred 'standard' and semi-standard guns in the Progressive line—pinch guns, push guns, expansion guns, etc.

Today, with a new plant providing ample manufacturing facilities Progressive is able to fill all indicated needs for portable welding guns. Furthermore, there is a standard Progressive gun for virtually every conceivable job, large or small—from inch sections to light gauge aluminum and stainless—cutting design costs and delivery time. Your blueprint will bring you a quotation virtually by return mail.

Standard and Special Welding Guns
Ultra-Speed Welders—Hydromatics
Pedestal Welders
Welding Transformers
Hydro Boosters
Punching Equipment
Pressure Switches—Welding Electrodes
P W Kickless Cables

There is a "Progressive" Representative or Distributor in your territory

PROGRESSIVE WELDER CO.

3017 East Outer Drive, Detroit, U.S.A.

Price Schedule No. 38

Glycerine

Grade

Refined Glycerine*

(1) C. P. Glycerine (98% glycerol)

	Cents per lb., delivered
Tank cars	18½
Drums, car lots	18¼
Drums, less than car lots	19¼

(2) C. P. Glycerine (U.S.P. 95% glycerol)

Tank cars	18
Drums, car lots	18¾
Drums, less than car lots	18¾

(3) Dynamite

Tank cars	18
Drums, car lots	18¼
Drums, less than car lots	18¾

(4) High Gravity

Tank cars	18
Drums, car lots	18¼
Drums, less than car lots	18¾

(5) Yellow Distilled

Tank cars	18
Drums, car lots	18¾
Drums, less than car lots	18¾

*Above prices are applicable to deliveries in Zones A and C. For deliveries of refined glycerine in Zone B, the maximum price is the maximum price for deliveries in Zones A and C plus 2c. per pound.

Crude Glycerine

(1) Soap lye (basis 80% glycerol)

Tank cars	11½
Drums, car lots	11½
Drums, less than car lots	11½

(2) Saponification (basis 88% glycerol) to refiners

Tank cars	12¾
Drums, car lots	12¾
Drums, less than car lots	12¾

(3) Saponification (basis 88% glycerol) for individual uses

Tank cars	12¾†
Drums, car lots	13¾†
Drums, less than car lots	14¾†

†F.O.B. point of manufacture.

(4) Other Crude Types

Maximum prices of crude glycerine, of glycerol percentages other than those listed above, in tank cars and drums (car lots and less than car lots), shall be determined at the rate of 11½c. per lb. delivered for glycerine of 80% glycerol content.

Notes:

Schedule became effective Nov. 10.

Zone "A" means: All points east of and including North Dakota, South Dakota, Nebraska, Kansas, Omaha, Texas, Laramie County, Wyoming, Colorado, east of but not including the following counties: Jackson, Grand, Gilpin, Jefferson, Douglas, Teller, Fremont, Custer, Huerfano, Costilla.

Zone "B" means: The territory between Zone A and Zone C, as follows: Washington, east of and including the following counties: Okanogan, Chelan, Kittitas, Yakima, Klickitat; Oregon, east of and including the following counties: Hood River, Wasco, Jefferson, Deschutes, Klamatch; Nevada, Arizona, New Mexico, that part of Colorado west of and including those counties mentioned above; Utah, Wyoming, excepting Laramie County, Idaho, Montana.

Zone "C" means the territory west of Zone "B".

Every buyer or seller must keep detailed records of all transactions. In addition, on or before Dec. 10, and every four months thereafter, all producers must submit a report on Form 138:1 showing inventories and other data. Also, all sellers must, beginning with Dec. 10 and every month thereafter, file an affidavit of compliance with this schedule on Form 138:2.

★ *Logan Live Roll tables in sheet shearing line-up (fed from Roller Conveyor storage lines) puts "flow" into steel mill processing operations.*

THE SHORTEST DISTANCE between receiving and shipping department, in anybody's mill or factory, is a "flowing" production line. Regardless of the type products you make, the chances are you can "Keep 'em Flowing" over a soundly engineered Logan installation—right through receiving, processing and other operations, to shipping dock. Putting FLOW into production increases output, multiplies capacity, saves manpower. In fact, it is the accepted ideal in modern plant practice. The nearest Logan engineer can tell you more. Call him in. LOGAN CO., Inc., 545 Cabel, Louisville, Ky.

Logan Conveyors

PUT *FLOW* INTO PRODUCTION

BLUEPRINTS AT *Thirty Feet* PER MINUTE WILL *Speed* YOUR PRODUCTION

American Industry, geared to fill larger and larger orders, is taxed to its utmost to meet new and constantly changing specification demands...faster production...faster delivery.

Pease Continuous Blueprinting Machines effectively bridge the gap between engineering and production departments...There is no costly "time out" waiting for blueprints... because, for example, Pease Model "22," illustrated, using fast blueprint paper and good tracings produces quality blueprints at a speed of 30 linear feet per minute.

Further; clear, contrasty blueprints can be made from pencil drawings, saving your overworked drafting department many tedious hours of inking in.

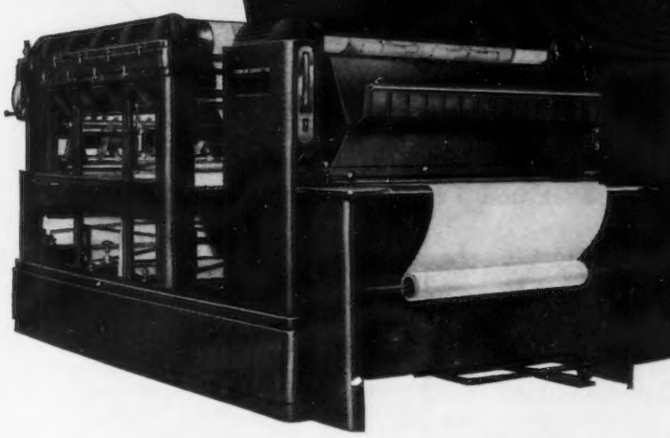
THREE SPEED LAMP CONTROL

Exclusive, Pease feature allows operation of Model "22" Printer lamps at 10, 15, or 20 amperes at will, eliminating frequent dryer heat changes. Mechanical operating speed remains same while lamp amperage is varied to suit tracings being printed. Convenient dial speed control provided.

OUTSTANDING FEATURES

- ★ Three Speed Lamp Control (Illustrated)
- ★ Sliding "Vacuum-like" Contact
- ★ Actinic "No-Break" Arc Lamps
- ★ Horizontal Water Wash
- ★ Quick Change Chemical Applicator System
- ★ Thermostatically Controlled Drying Drums, either gas or electric

Pease equipment installed now will meet every challenge for many years to come. Write for literature illustrating and describing our complete line.



Pease Model "22" Continuous Blueprinting, Washing, Developing and Drying Machine. Production Speed 30 feet per minute.

THE C. F. PEASE COMPANY

2695 WEST IRVING PARK ROAD
CHICAGO • ILLINOIS

Blueprinting Machines A TYPE AND SIZE FOR EVERY REQUIREMENT INCLUDING DIRECT PROCESS PRINTING

Price Schedule No. 40

Builders' Hardware and Insect Cloth

The maximum prices established by this schedule cover the items listed in Table I below. The ceiling price for these items is the highest price received by the seller for delivery between Sept. 22 and Oct. 21, 1941, of approximately the same grade, quality and amount to the same purchaser. If no delivery was made to the same purchaser, the maximum then shall be the price applicable under this schedule to another purchaser recognized by the trade as entitled to the same treatment.

If no delivery of approximately the same grade, quality or amount was made, the ceiling then shall be determined from the price of a related builders' hardware or insect cloth product (one bearing a recognized or determinable price relationship).

In cases other than those covered above, the maximum price is the market price during the specified period for the same product, grade, quality, amount and type of purchaser.

The schedule applies to all persons except retailers who are described as a store or other establishment where 75 per cent of the dollar volume of sale of all products during the six months preceding the effective date of this schedule consisted of sales without discount (except cash discount) from said person's regular retail price.

All sellers, other than retailers, whose sales exceeds $1000 a month on the items covered herein must keep a record of every sale of the products affected. In addition, all persons affected by this schedule must have available a record of selling prices for these products during the period from Sept. 22 to Oct. 21, 1941.

Table I

The schedule became effective Nov. 19.

Items Covered By Schedule

Knobs, handles, escutcheons, roses, key plates, push buttons, lever handles and drop and ring handles.

Locks

Upright rim knob locks, padlocks, rim knob locks, draw-back knob locks, horizontal rim knob locks, rim knob latches, cylinder rim night latches, cylinder rim dead locks, bathroom locks, sliding door locks, communication door locks, school house locks, asylum latches, french door latches, cylinder apartment locks, cylinder hotel locks, cylinder sliding door locks, cylinder mortise locks, hotel locks and key blanks.

Above locks are affected when used for following doors: outside, inside, hospital, screen, French, bathroom, lavatory, garage and sliding doors.

Hinges

Loose pin, ball bearing, frictionless, hinge plates, transom hinges, floor spring hinges, strap hinges, showcase hinges, screen door hinges, cabinet hinges, lavatory door strikes and keepers, spring hinges and T-hinges.

Miscellaneous Door Hardware

Closers, holders, bumpers, stays, square spring bolts, door pulls, bells, hooks, bolts, checks (screen), fasteners (chain), thumb latches, push and kick plates, panic bolts, exit bolts and door stops.

Window Hardware

Window bolts, casement window bolts, casement window adjusters, casement window operators, french window bolts, blind hold backs, sash lifts, sash fasteners, pulleys and springs.

Screen Hardware

Window screen brackets and corners, door screen brackets and corners, door screen catches, hooks (screen) and springs (screen).

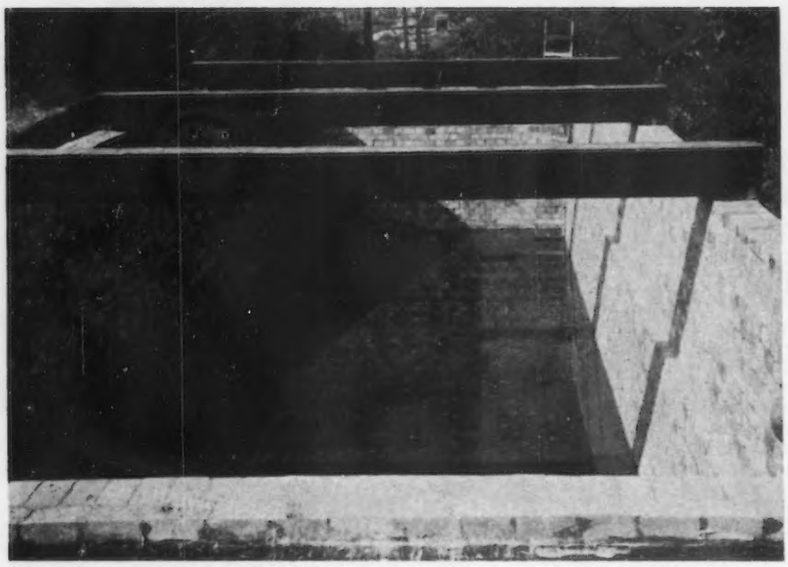
Miscellaneous

Letter box plates, number plates, name plates, house numbers, snap catches, closet locks, thumb latches, transom and sash pivots, transom chains, transom lifters, transom catches, spring window bolts and screw hooks and eyes.

Insect Screen Cloth

Painted steel wire, electro-galvanized steel wire, commercial bronze, hand-drawn copper, koolshade fabric.

BASOLIT
Acid *Neutralizing* Tank



● 2500 gallons of waste pickling acid are dumped every 24 hours into this 90,000 gallon acid disposal tank recently installed for a large wire mill in the Mid-west.

● Tank is 60 ft. long, 20 ft. wide and 12 ft. deep, constructed of reinforced concrete shell, lined with TORONTO Acid Brick and acid-proof jointing Cement, BASOLIT.

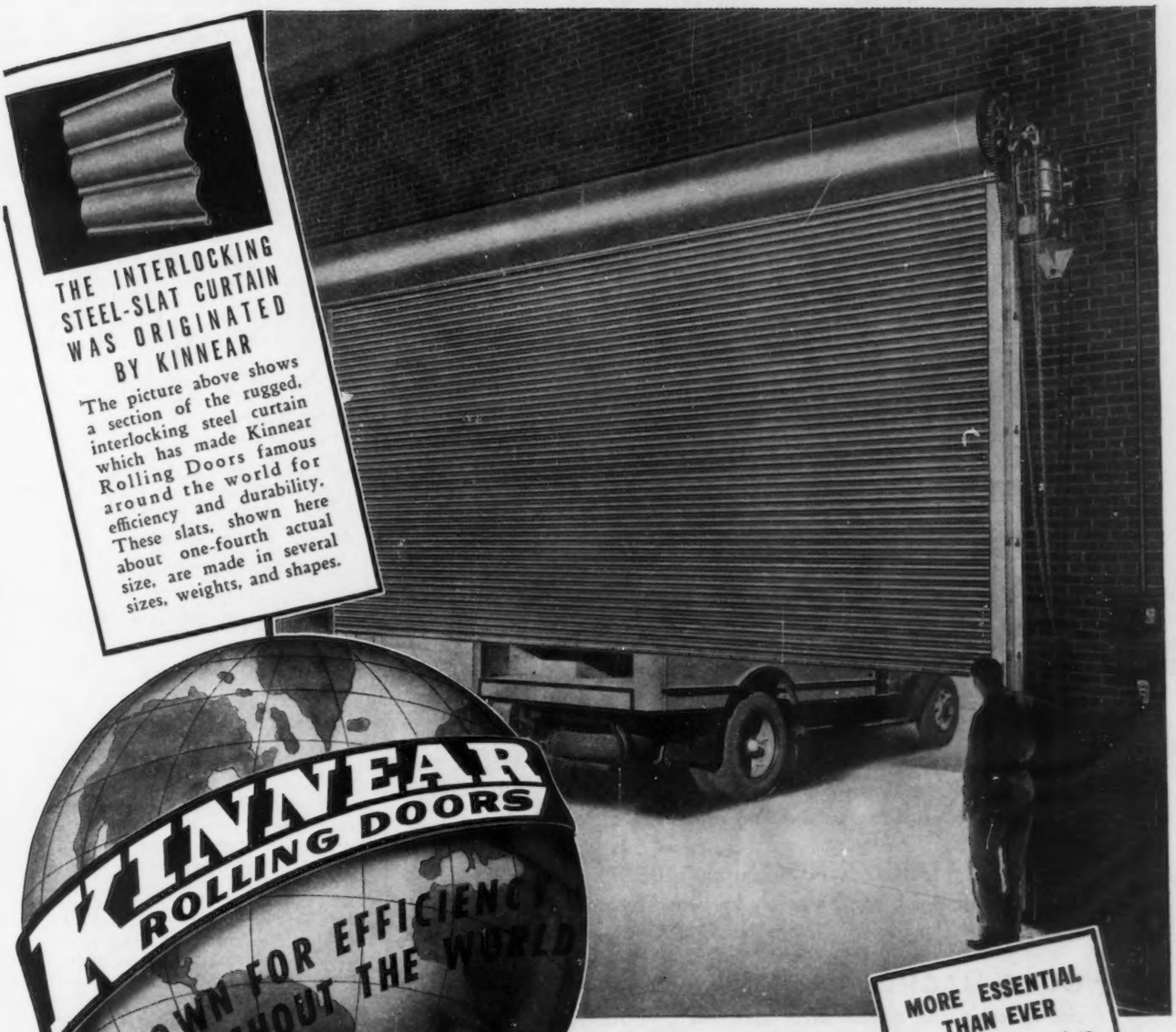
● There are many hundreds of rubber lined steel and reinforced concrete pickling tanks, acid storage and neutralizing tanks and acid floors, sewers and pits, where our BASOLIT construction has contributed to long life and efficient operation of modern pickling equipment.

● Our Engineering Department will be pleased to furnish detailed drawings and estimates without cost to you.

NUKEM PRODUCTS CORP. 68 NIAGARA ST. BUFFALO, N. Y.

NEW YORK DETROIT PITTSBURGH STEUBENVILLE, O.

PROTECTION that AIDS PRODUCTION



THE INTERLOCKING STEEL-SLAT CURTAIN WAS ORIGINATED BY KINNEAR

The picture above shows a section of the rugged, interlocking steel curtain which has made Kinnear Rolling Doors famous around the world for efficiency and durability. These slats, shown here about one-fourth actual size, are made in several sizes, weights, and shapes.

KINNEAR ROLLING DOORS

KNOWN FOR EFFICIENCY THROUGHOUT THE WORLD

A WORLD-WIDE REPUTATION for high efficiency and lasting dependability has been built—and maintained—by Kinnear Rolling Doors throughout almost half a century. And today they are more widely preferred than ever before, because of increasing demands for the many advantages they offer. Their convenient, coiling, upward operation saves floor and wall space. They open completely out of the way, out of reach of damage. Their all-steel construction protects openings against fire, keeps out intruders, thieves, saboteurs, and resists damage by vehicles, windstorms, or the elements. Their famous interlocking-steel-slat curtain is strong, but flexible, so that it absorbs shocks and blows, and resists wear. You can always depend on Kinnear Rolling Doors for long, economical door service. We invite you to request any information you may wish, without obligation.

MORE ESSENTIAL THAN EVER

Now that complete safety for vital production on every home front has become an absolute "must", the extra protection of Kinnear Rolling Doors is more significant than ever! They barricade openings with a rugged curtain of steel . . . they close light-tight for blackout safety . . . and yet they offer highest efficiency, with motor operation and remote control if desired.

The KINNEAR MANUFACTURING COMPANY
1760-80 FIELDS AVENUE COLUMBUS, OHIO, U.S.A.

Price Schedule No. 41

Steel Castings

This schedule, which became effective Nov. 15, establishes prices for steel castings which are described as any cast steel object that has been initially cast into the desired shape of the finished product and which contains less than 1.70 per cent carbon, and/or alloys totaling not more than 8 per cent and including railroad specialty and miscellaneous castings.

It is stipulated that on and after Dec. 1, no castings can be bought or sold at prices, including extras, terms and conditions, higher than that which were or would have been charged on July 15, 1941, and which (after Dec. 1, 1941) are filed with the OPA in accordance with the terms of this schedule.

New Casting Prices

Any casting producer undertaking to make a casting which is part of an order of $100 or more, which has not previously been made by the producer and which is substantially different in design from any steel casting previously made, is required to file with OPA a copy of the estimate for the casting with an explanation and description of the price computations. However, when such a casting is priced in accordance with the "Comprehensive Report of Price Lists of Miscellaneous Castings," published by the Steel Founders' Society of America for the third quarter of 1941, the casting maker is not required to file an estimate sheet with OPA.

Each producer is required to file with OPA, on or before Dec. 1, the prices, extras, terms and conditions, classified by size and quantity, which would have or did control sales on July 15, 1941. However, if such prices coincide with the price report of the Steel Founders mentioned above, the producer need only report that fact and no other details are required.

Producers must file monthly affirmation of compliance with the terms of this order.

—The Iron Age—

HOW JESSOP TRUFORM OIL HARDENING TOOL STEEL Speeds up Tool and Die Production

THE present shortage of skilled tool and die makers makes it advisable to specify Jessop's TRUFORM oil-hardening tool steel for many applications where water hardening steel was once used but which cannot be handled safely by inexperienced men. If there is any danger of the tool or die cracking during heat treatment, it is always safest to specify TRUFORM. The following are some of the outstanding properties of this steel:

✔ **EASE OF HARDENING**—Jessop TRUFORM is a non-deforming tool steel which can be safely hardened by a relatively inexperienced man. Die spoilage is practically eliminated.

✔ **GOOD MACHINABILITY**—Jessop TRUFORM is given a special spheroidizing anneal after hammering or rolling so that it can be easily machined.

✔ **MINIMUM SIZE CHANGE**—Jessop TRUFORM resists size change to a remarkable degree; consequently, dies seldom need to be ground after heat treatment.

If your tools and dies are of intricate shape, or must possess extreme accuracy, play safe by specifying Jessop TRUFORM Oil-Hardening Tool Steel. Descriptive folder sent free upon request.

JESSOP STEEL COMPANY
General Offices and Works
WASHINGTON, PENNA., U. S. A.

JESSOP STEELS FOR AMERICA AND HER ALLIES

CARBON · HIGH SPEED · SPECIAL ALLOY · STAINLESS · COMPOSITE STEELS

Price Schedule No. 43

Second Hand Steel Drums

Maximum Prices

(a) Reconditioned barrels or drums

Maximum price for reconditioned steel barrels or drums, size 50 to 55 gallons, 18 gage, except reconditioned barrels or drums which have been lacquer-relined and baked, shall be $2.25 per barrel or drum, delivered to a purchaser situated within a radius of 50 miles from the plant where the barrel or drum was reconditioned. However, for each 75 miles, or fraction in excess of 50 miles, all actual charges for transportation or the sum of 10c. per barrel or drum, whichever is lower, may be added. Provided, that where a barrel or drum is reconditioned and delivered in California, Washington and Oregon, the sum of 50c. may be added to the above maximum charges.

(b) Lacquer-relined and baked drums

Maximum price for reconditioned steel barrels or drums, size 50 to 55 gallons, 18 gage, which have been lacquer-relined and baked, shall be the maximum prices set forth in paragraph (a) above, to which may be added 25c. per barrel or drum.

(c) Raw used drums, delivered

Except as provided in paragraph (d) below, the maximum price for raw used steel barrels or drums, size 50 to 55 gallons, 18 gage, shall be $1.60 per barrel or drum delivered to the plant of the user or reconditioner; except that in California, Washington and Oregon 40c. per barrel or drum may be added.

AMCO

AMCO Rotary Hearth Furnace. Side View showing Blower, Fuel Air Control Valves and Hearth Drive.

FURNACES

For Today's Vital Needs

AMCO Heavy Duty Furnace for heating large forgings, ship, railroad equipment.

AMCO Rail Reheating Furnace. Fired with pulverized coal, automatically controlled.

Representing a distinct advance in the technology of the application of heat to metals, AMCO FURNACES successfully and economically meet the varied and pressing demands of today in the vital steel-making industry!

They can be equipped with automatic temperature and pressure controls and can be adapted to the use of all fuels, including *pulverized coal!*

Write for our new Silver Anniversary brochure detailing and picturing AMCO Products

The AMSLER-MORTON Company

FULTON BUILDING · PITTSBURGH, PA.

(d) Raw used drums at source

Maximum prices for raw used steel barrels or drums, size 50 to 55 gallons, 18 gage, purchased by a user directly from the person who empties the barrels or drums, shall be $1.25 per barrel or drum, f.o.b. point where barrel or drum is emptied; except that in California, Washington and Oregon, the sum of 40c. per barrel or drum may be added.

(e) Other reconditioned drums

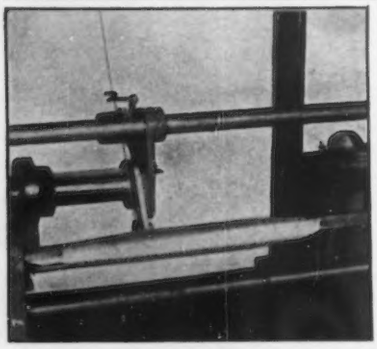
Maximum delivered price for reconditioned steel barrels or drums, other than those covered by paragraphs (a) and (b) above, shall be 80 per cent of the delivered price, excluding extras, quoted by the Rheem Mfg. Co. or by Wheeling Corrugating Co., when delivered in carload lots of new, black, hot-rolled steel barrels or drums of the same type and size; except that for each 75 miles or fraction in excess of 50 miles from the plant where the barrel or drum was reconditioned, all actual charges for transportation or the sum of 10c. per barrel or drum, whichever is lower, may be added.

(f) Other raw used drums

Maximum delivered price for raw used steel barrels or drums, other than those covered by paragraphs (c) and (d) above, delivered to the plant of the user or reconditioner, shall be 65c. less than the maximum price provided in paragraph (e) above for a reconditioned barrel or drum of the same size and type.

Notes: Schedule was announced Nov. 25 to become effective Dec. 18. A reconditioned barrel or drum means a used steel barrel or drum which has been painted, de-dented, chained, welded or subjected to any other reconditioning process by which a raw barrel or drum is made fit for re-use. Commissions, service charges or other additional charges may not be added to the above schedule of prices.

—The Iron Age—



New **FIDELITY Quill Winder..**

Accurate Taper Winding of Wire for Weaving of Wire Cloth for FILTERS · SCREENS · SIFTERS, etc.

The new FIDELITY Quill Winder for accurate, high-speed taper winding of wire—six packages of uniformly even lay and taper at one time—speeds production for manufacturers of wire cloth for filters, screens, sifters, etc.

The taper is automatically governed by pressure control buttons which reverse and successively shorten the traverse in the same operation.

A clutch regulates tension to conform to speed and pick-up...eliminates wire breakage. Other outstanding advantages include: hydraulic control, individual motor drive, stop motion on feeder and winder, and automatic yardage meter.

You can wind wire from spools or brake-controlled reels depending on your requirements.

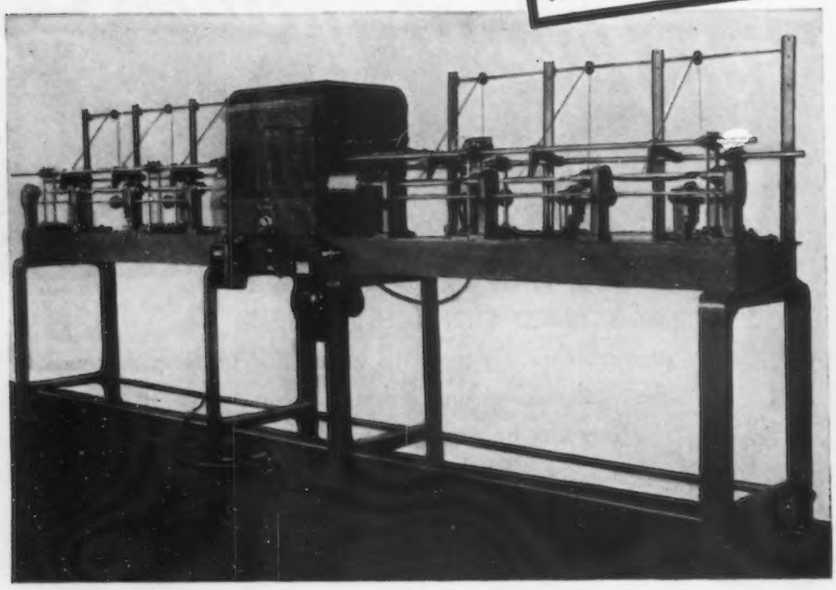
For further information and details, write for Bulletin

FIDELITY MACHINE COMPANY

3908-18 Frankford Avenue, Philadelphia, Pa.

Specifications
FIDELITY QUILL WINDER

1. Spindle speed, 1750 R.P.M.
2. Six quills wound simultaneously
3. Maximum traverse, 10 inches
4. Dial control for traverse changes
5. Automatic stop motion
6. Automatic angular winding attachment
7. Automatic yardage meter
8. Winds from either spools or reels
9. Push-button control
10. ¾ HP motor
11. 2' x 13½' floor space



Price Schedule No. 46

Relaying Rail

Class I Relaying Rails

Maximum price of relaying rail, weighing 35 lb. or more per yard, originating from class I railroads and class I switching or terminal companies, except when such rail is sold in track, shall be $28 per gross ton f.o.b. any station on the selling railroad at the option of the buyer. Except, that when such rail is purchased by dealers or jobbers, such dealers or jobbers may sell such rail at a maximum price of $30 per gross ton f.o.b. shipping point except as noted in warehouse section below.

Other Rails

Maximum prices, f.o.b. shipping point, for relaying rail weighing 35 lbs. or more per yard, other than rail covered above or in warehouse section below, shall be $30 per gross ton minus the lowest railroad freight charge for transporting such rail from the shipping point to the basing point nearest freightwise to the shipping point. Except that the shipping point price need in no case be less than $22 per gross ton.

The following cities are designated basing points: Boston, Philadelphia, Buffalo, Pittsburgh, Cleveland, Cincinnati, Detroit, Chicago, Savannah, Ga.; Norfolk, Va.; Minneapolis, St. Louis, Mo.; Kansas City, Birmingham, Houston, Tex.; Los Angeles, San Francisco, Portland Ore., and Seattle, Wash.

Warehouse Sales

Maximum price of relaying rail weighing 35 lb. or more per yard, which has been shipped to recognized relaying rail warehouses equipped with machinery for reconditioning, and there unloaded, when sold from such warehouse shall be $1.60 cwt. f.o.b. warehouse for quantities of 25 gross tons and over; $2 cwt. f.o.b. warehouse for quantities of 5 to less than 25 gross tons; and $2.25 cwt. f.o.b. warehouse for quantities less than 5 gross tons.

Persons desiring to sell as warehouses must file with OPA a statement indicating that they operate a recognized warehouse equipped with machinery for reconditioning. A storage point or yard, not customarily operated as warehouse, cannot sell as a warehouse.

Now DIAMOND G LOCKWASHERS have
CONTROLLED TENSION
HELPS KEEP BOLTED ASSEMBLIES TIGHTER LONGER . . . IMPROVES QUALITY
Here's a *plus* in lock washers that will benefit every industry! *Controlled Tension* to maintain a constant tightening force to prevent loosening of bolted assemblies whether the washer is tightened to a flattened-out position, or partly expanded. It's an exclusive Diamond G feature built into every Diamond G Lockwasher . . . the result of precision control in manufacturing to give you positive tension control in assemblies.
You'll find *Controlled Tension* in every Diamond G Lockwasher . . . the new, revolutionary Double-Duty Washer . . . the ordinary spring lock washer . . . or the stainless steel, phosphor-bronze or cadmium plated lock washers. They're all high in quality, low in price and ready for quick deliveries when you need them.
Now's the time to prove what Diamond G *Controlled Tension* can do to help you cut production delays . . . and keep bolted assemblies tighter for a longer time. Write for new free folder on *Controlled Tension* to
GEORGE K. GARRETT CO.
1421 Chestnut Street, Philadelphia
IMMEDIATE DELIVERIES
on lockwashers now! Write for full information
DIAMOND G LOCKWASHERS

Notes:

This schedule became effective Dec. 2, 1941. A shipping point is taken to mean on board the transporting medium to be used to move material to the buyer, whether truck, freight car, barge or ship.

Every person, other than the ultimate consumer, buying used rail in quantities above 100 gross tons, must file within 10 days a report showing the breakdown of the lot into relaying, rerolling and scrap rails. Every seller making a sale of 25 tons or more of relaying rails must report to OPA within 10 days certifying that the rails are for relaying. This certification may be in form of a report from an independent inspection bureau or an affidavit from the consumer indicating that the rails will be used for relaying purposes.

In addition, both buyers and sellers must keep specified monthly data available for inspection for a period of not less than one year.

DROP
FORGINGS

AUTOMOTIVE
INDUSTRIAL
AIRCRAFT

Laboratory Controlled

THE
CHAMPION
MACHINE & FORGING CO.
3695 East 78th St. Cleveland, Ohio

Price Schedule No. 49

Iron and Steel Products—Resale Prices

This schedule, which establishes maximum delivered prices, covers any person who resells iron and steel products, whether as distributer, jobber, dealer, agent, broker, merchant, exporter, or any other type of intermediary, but excludes producers covered by schedule No. 6. Retail merchants who sell iron and steel in quantities smaller than those dealt in or on which prices are quoted by established jobbers, etc. Products covered by this schedule are given in Table I. The schedule became effective Dec. 15, 1941.

(A) Prices in City or Free Delivery Area in Which Seller Is Located

In any city or free delivery area in which the seller is located, the maximum delivered price for any iron or steel products shall be the delivered price which was or would have been charged by the seller on April 16, 1941. Provided, however, that in cities designated in Table II as Listed Cities, the maximum delivered price shall not exceed the published listed prices, as set out in Table II, in effect as of April 16, 1941, for that city or free delivery area. Also in Unlisted Cities, the maximum delivered price shall not exceed the lowest delivered price that is the result of a combination of (a) country prices of any seller located in any Listed City, and (b) less-than-carload freight from such Listed City.

Extras which were customarily charged as of April 16, 1941, may be computed in the maximum delivered price. Extras listed but not customarily charged as of April 16, 1941, shall not be charged. Deductions customarily granted as of April 16, 1941, shall be deducted in computing the maximum delivered price.

(B) Other Delivery Areas

In any place other than a city or free delivery area in which the seller is located, the maximum delivered price is the lowest delivered price that is the result of a combination of (a) country price of any seller located in any Listed City and (b) less-than-carload freight from such Listed City. However, in no case shall the maximum delivered price on a sale for delivery into a Listed City exceed published listed prices, as set out in Table II.

(C) Sellers Having No Prices

In Listed Cities, the maximum delivered price for such persons shall not exceed the published listed prices set out in Table II, for that city or free delivery area. In Unlisted Cities, the maximum delivered price shall not exceed the lowest delivered price that

THE WILL TO MAKE GOOD STEEL

MAKING the kind of steel our country demands for its defense program requires a thorough knowledge of the steels needed, an organization of skilled steel makers, the best of steel making equipment, and — above all — the W I L L to make good steel.

The Copperweld Steel Company is producing the following Aristoloy Steels particularly for National Defense: RIFLE AND GUN BARREL QUALITY, GUN QUALITY, SHOT QUALITY, BULLET CORE AND AIRCRAFT QUALITY.

"SPECIAL QUALITY" TOOL AND ELECTRIC FURNACE ALLOY STEELS

CARBON TOOL STEELS
ALLOY TOOL STEELS
STAINLESS STEELS
NITRALLOY STEELS
AIRCRAFT QUALITY STEELS
BEARING QUALITY STEELS

ARISTOLOY STEELS

ARISTOLOY STEELS

COPPERWELD STEEL COMPANY WARREN, OHIO

OPA Price Ceilings On P

Maximums Under Schedule No. 6

Presented herewith are ceiling basing point prices of principal steel products covered by OPA Price Schedule No. 6. This schedule, which covers only producers' quotations, became effective April 17 and froze prices at levels prevailing during the first quarter of 1941 (see THE IRON AGE, April 25, 1941, p. 86). Resale prices for products sold through warehouses, distributors, etc., are covered by Price Schedule No. 49 (published in the Price Section in this issue).

The term, "basing point base prices", means the prices announced prior to December 31, 1940, or customarily quoted by Carnegie-Illinois Steel Corp., American Steel & Wire Co., Tennessee Coal, Iron & Railroad Co., National Tube Co., and Columbia Steel Co., as base prices effective during the first quarter of 1941, or in effect on April 16, 1941, and applicable at designated basing points for iron or steel products. Maximum export prices are those quoted by United States Steel Export Co., on April 16, 1941. A complete list of these export prices was published in THE IRON AGE on June 26, 1941, p. 112.

PRODUCT	BASE SIZE	Dollars Per Unit	Pitts-burgh	Youngs-town	Cleve-land
Axles		100 lb.	3.15	....	....
Pipe—Welded	None	100 ft.	(Separate for Sizes and Types)		
Seamless	None	100 ft.	(Separate for Sizes and Types)		
Terne Plate (Mfr.)	100 lb. 14 x 20—112 Sheets	B.B.	4.30	....	....
Black Plate	29 ga.—over 15" to 30"	100 lb.	3.05	....	....
Tin Plate	100 lb. 14 x 20—112 Sheets	B.B.	5.00	....	....
Sheets—Hot Rolled—Flat	10 ga. and heavier over 20" to 48" x 30" and over	100 lb.	2.10	2.10	2.10
Corrugated	2", 2½" and 3" Corr. 26" Wide	(Separate for Gages)			
Cold Rolled	17 ga. 24" to 48"	100 lb.	3.05	3.05	3.05
Galvanized	24 ga. 24" to 36" x 60" to 144"	100 lb.	3.50	3.50	....
Long Ternes	24 ga. 8/12 lb. coating	100 lb.	3.80	....	....
Enamelling	10 ga. 24" to 48" x 30" to 144"	100 lb.	2.75	2.75	2.75
Electrical	None	100 lb.	(See Individual Extra List for		
Strip—Hot Rolled	None	100 lb.	2.10	2.10	2.10
Cold Rolled	0.161" and thicker x over 6" to 23⅛" wide in coils	100 lb.	2.80	2.80	2.80
Commodity C. R.	None	100 lb.	2.95	2.95	2.95
Alloy		100 lb.	2.70	....	....
Wire Rods	No. 5 to 9/32"	100 lb.	2.00	....	2.00
Mfrs. Wire—Black and Galv.	6 to 9 ga. Black	100 lb.	2.60	....	2.60
Prem-Spring Wire	6 to 9 ga. Black	100 lb.	3.20	....	3.20
Merchant Wire—Galv.	6 to 9 ga. 100 lb. Bdls.	100 lb.	3.40	....	3.40
Annealed	6 to 9 ga. 100 lb. Bdls.	100 lb.	3.05	....	3.05
Barbed Wire	None	Spool	Col. 0.70	....	Col. 0.70
Nails and Staples	None	100 lb.	2.55	....	2.55

PRODUCT	BASE SIZE	Dollars Per Unit	Pitts-burgh	Youngs-town	Cleve-land	Clay-mont	Buffalo	Chicago	Gary	Birming-ham	Duluth	Bethle-hem	Coates-ville
Ingots/Alloy		....	45.00	.....	.....	.....	.....	45.00	.....	.....	.....	.....	.....
Ingots—(Forging) Carbon		GT	36.00	36.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
Blooms—Billets—Slabs (Alloy)	4x4 to 9x9	GT	54.00	.....	.....	.....	54.00	54.00	.....	.....	.....	54.00	.....
Rerolling (Carbon)		GT	34.00	34.00	34.00	.....	34.00	34.00	34.00	34.00	36.00 billets	.....	.....
Forging (Carbon)		GT	40.00	40.00	40.00	.....	40.00	40.00	40.00	40.00	42.00 only	.....	.....
Sheet Bars	All	GT	34.00	34.00	34.00	.....	34.00	34.00	.....	.....	.....	.....	.....
Skelp	6" to 20" x ¼" to ⅜"	100 lb.	1.90	1.90	.....	.....	.....	1.90	.....	.....	.....	.....	1.90
Bars—Hot Rolled—Carbon	Rnds. and Sq. 47/64" to 1½"	100 lb.	2.15	.....	2.15	.....	2.15	2.15	2.15	2.15	2.25	.....	.....
	Flats 1" to 6" x ⅜" to 1"												
Alloy	Flats 1" to 6" x ⅜" to 1"	100 lb.	2.70	.....	.....	.....	2.70	2.70	.....	.....	.....	2.70	.....
Cold Finished—Carbon	None	100 lb.	2.65	.....	2.65	.....	2.65	2.65	2.65	.....	.....	.....	.....
Alloy	None	100 lb.	3.35	.....	3.35	.....	3.35	3.35	3.35	.....	.....	.....	.....
Concrete Reinforcing	Rounds ¾" to 1"	100 lb.	2.15	2.15	2.15	.....	2.15	2.15	2.15	2.15	.....	.....	.....
	Square 1" to 1¼"												
Shapes—Small (Bar Size)	None	100 lb.	2.15	.....	2.15	.....	2.15	2.15	2.15	2.15	2.25	.....	.....
Structural Angles Zees Tees	3" to 6"	100 lb.	2.10	.....	.....	.....	2.10	2.10	2.10	2.10	.....	2.10	.....
Beams	3" to 15"												
Plates—Sheared and Universal	¼" to 2" by up to 100"	100 lb.	2.10	2.10	2.10	2.10	.....	2.10	2.10	2.10	.....	.....	2.10
Alloy		100 lb.	3.50	.....	.....	.....	.....	3.50	.....	.....	.....	.....	3.50
Sheet Piling (New)	All sections except Z section	100 lb.	2.40	.....	.....	.....	2.40	2.40	.....	.....	.....	.....	.....
(Used)	All sections except Z section	100 lb.	1.60	.....	.....	.....	1.60	1.60	.....	.....	.....	.....	.....
(Leased)	All sections except Z section	100 lb.	1.00	.....	.....	.....	1.00	1.00	.....	.....	.....	.....	.....
Rails—Std. (over 60 lb.)	Std. 39', 33', and 30' lengths	(Basing points not observed—Sold F.O.B. Mill of Manufacture)											
Light (under 60 lb.)	25 to 60 lb.	GT	40.00	.....	.....	.....	.....	40.00	.....	.....	.....	.....	.....
Splice Bars		(Sold F.O.B. Mill of Manufacture)											
Floor Plates		100 lb.	3.35	.....	.....	.....	.....	3.35	.....	.....	.....	.....	.....
Tie Plates A. R. E. A.	Std. Specs.	NT	43.00	.....	.....	.....	43.00	43.00	.....	43.00	(Portsmouth; Minnequa, Col.; Louis and Steelton basing		
Track Spikes A. R. E. A.	Std. Specs.	100 lb.	3.00	3.00	.....	.....	.....	3.00	.....	3.00	.....	.....	.....
Track Bolts (Nuts)	3½" and over x ¾" Sq. Nuts	....	4.15	.....	4.15	.....	.....	4.15	.....	4.15	.....	.....	.....

Principal Steel Products

Claymont	Buffalo	Chicago	Gary	Birmingham	Duluth	Bethlehem	Middletown	Granite City	Worcester	Pacific Coast	PRODUCT	BASE SIZE
....	....	3.15	....	3.15	....	....	....	....	....	....	Axles	
		(Separate for Sizes and Types. Basing Points are Pittsburgh, Lorain and Gary)									Pipe—Welded	None
		(Separate for Sizes and Types. Basing Points are Pittsburgh, Lorain and Gary)									Seamless	None
....	....	4.30	4.30	....	....	....	....	4.40	....	....	Terne Plate (Mfr.)	100 lb. 14 x 20—112 Sheets
....	....	3.05	3.05	....	....	....	....	3.15	....	4.05	Black Plate	29 ga.—over 15 in. to 30 in.
....	....	5.00	5.00	....	....	....	....	5.10	....	....	Tin Plate	100 lb. 14 x 20—112 Sheets
....	2.10	2.10	2.10	2.10	(Sparrows Pt.-$2.10)	2.10	2.20	....	....	2.65	Sheets—Hot Rolled—Flat	10 ga. and heavier over 20" to 48" x 30" and over
		(Separate for Gages)									Corrugated	2", 2½" and 3" Corr. 26" Wide
....	3.05	3.05	3.05	....	....	....	3.05	3.15	....	3.70	Cold Rolled	17 ga. 24" to 48"
....	3.50	3.50	3.50	3.50	(Sparrows Pt.-$3.50)	3.50	3.50	3.60	....	4.05	Galvanized	24 ga. 24" to 36" x 60" to 144"
....	....	....	3.80	....	....	....	....	....	....	4.55	Long Ternes	24 ga. 8/12 lb. coating
....	....	2.75	2.75	....	....	....	2.75	2.85	....	3.40	Enameling	10 ga. 24" to 48" x 30" to 144"
Grades.	Basing Points are Pittsburgh, Granite City and Pacific Coast)										Electrical	None
....	....	2.10	2.10	2.10	....	....	2.10	....	....	2.75	Strip—Hot Rolled	None
....	....	2.90	....	....	....	....	....	....	3.00	....	Cold Rolled	0.161" and thicker x over 6" to 23⅛" wide in coils
....	....	....	....	....	....	....	....	....	3.35	....	Commodity C. R.	None
....	2.70	2.70	(Canton, Massillion-$2.70)		2.70	....	....	....	....	....	Alloy	
....	....	2.00	....	2.00	....	(Galveston-$2.23)			2.10	2.50	Wire Rods	No. 5 to 9/32"
....	....	2.60	....	2.60	2.65	....	....	....	2.70	3.10	Mfrs. Wire—Black and Galv.	6 to 9 ga. Black
....	....	3.20	....	....	....	....	....	....	3.30	3.80	Prem-Spring Wire	6 to 9 ga. Black
....	....	3.40	....	3.40	3.40	....	....	....	....	....	Merchant Wire—Galv.	6 to 9 ga. 100 lb. Bdls.
....	....	3.05	....	3.05	3.05	....	....	....	....	....	Annealed	6 to 9 ga. 100 lb. Bdls.
....	....	Col. 0.70	....	Col. 0.70	Col. 0.70	....	....	....	....	....	Barbed Wire	None
....	....	2.55	....	2.55	2.55	....	....	....	....	3.05	Nails and Staples	None

Sparrows Point	Gulf Ports	Lebanon Pa.	Weirton	Middletown	Detroit	Worcester	Toledo	Granite City	Galveston	Canton	Massillon	Pacific Coast	PRODUCT	BASE SIZE
....	....	....	....	....	....	....	....	....	....	....	....	....	Ingots Alloy	
....	....	....	....	....	....	....	....	....	....	....	....	....	Ingots—(Forging) Carbon	
....	....	....	....	....	56.00	....	....	....	....	54.00	54.00	....	Blooms—Billets—Slabs (Alloy)	4x4 to 9x9
34.00	....	....	....	....	36.00	....	....	....	....	....	....	....	Rerolling (Carbon)	
....	....	....	....	....	42.00	....	....	....	....	....	....	....	Forging (Carbon)	
34.00	....	....	....	....	....	....	....	....	....	34.00	....	....	Sheet Bars	All
1.90	....	....	....	....	....	....	....	....	....	....	....	....	Skelp	6" to 20" x ¼" to⅜"
....	2.50	....	....	....	....	....	....	....	....	....	....	2.80	Bars—Hot Rolled—Carbon	Rnds. and Sq. 47/64" to 1½"; Flats 1" to 6" x ⅜" to 1"
....	....	....	....	....	....	....	....	....	....	2.70	2.70	....	Alloy	Flats 1" to 6" x ⅜" to 1"
....	....	....	....	....	2.70	....	....	....	....	....	....	....	Cold Finished—Carbon	None
....	....	....	....	....	3.40	....	....	....	....	....	....	....	Alloy	None
2.15	2.50	....	....	....	2.25	....	2.30	....	....	....	....	2.50	Concrete Reinforcing	Rounds ¾" to 1"; Square 1" to 1¼"
....	2.50	....	....	....	....	....	....	....	....	....	....	2.80	Shapes—Small (Bar Size)	None
....	2.45	....	....	....	....	....	....	....	....	....	....	2.75	Structural Angles Zees Tees	3" to 6"
2.10	2.45	....	....	....	....	....	....	....	....	....	....	2.65	Beams	3" to 15"
....	3.95	....	....	....	....	....	....	....	....	....	....	4.15	Plates—Sheared and Universal	¼" to 2" by up to 100"
....	....	....	....	....	....	....	....	....	....	....	....	2.95	Alloy	
....	....	....	....	....	....	....	....	....	....	....	....	2.05	Sheet Piling (New)	All sections except Z section
....	....	....	....	....	....	....	....	....	....	....	....	1.55	(Used)	All sections except Z section
(Basing points not observed—Sold F.O.B. Mill of Manufacture)													(Leased)	All sections except Z section
....	....	....	....	....	....	....	....	....	....	....	....	....	Rails—Std. (over 60 lb.)	Std. 39', 33' and 30' lengths
(Sold F.O.B. Mill of Manufacture)													Light (under 60 lb.)	25 to 60 lb.
....	3.70	....	....	....	....	....	....	....	....	....	....	4.00	Splice Bars	
Kansas City, Mo.; St.			43.00	....	....	....	....	....	....	....	....	46.00	Floor Plates	
point prices are $3)													Tie Plates A. R. E. A.	Std. Specs.
....	....	3.00	3.00	(Portsmouth; Minnequa, Col. Kansas City, Mo.; St. Louis and Richmond basing point prices are $3)								3.20	Track Spikes A. R. E. A.	Std. Specs.
....	....	....	....	....	....	....	....	....	....	....	....	....	Track Bolts (Nuts)	3½" and over x ¾" Sq. Nuts

is the result of a combination of (a) country prices of any seller located in any Listed City, and (b) less-than-carload freight from such Listed City.

If a person not having prices sells for delivery into a place other than the city or free delivery area in which he is located, the maximum delivered price shall be set in conformance with paragraph "Other Delivery Areas" above.

(D) Export Prices

Export prices are to be computed on basis of the methods described in sections A, B, C and F, f.a.s. the port of export. On shipments of less-than-carload quantities, a mark-up of $3 a net ton is permitted if sold by an export broker. Extras and deductions must be handled as described above.

Dislocated Tonnages

In case of shipments by a seller of 150 miles or more, and if shipment is through or into any Listed City, or substantially in the same direction and past any Listed City, or in case of any shipments by a seller of not less than 350 miles, the maximum delivered price for any iron or steel product so shipped may be increased by the excess of (1) the country price of the seller plus less-than-carload freight as customarily charged less 15c. per cwt., above (2) the maximum delivered price for the place of delivery as computed in section "Other Delivery Areas."

(E) Pacific Coast and Gulf Ports

Pacific Coast prices are to be computed as described in sections (A), (B), (C) and (F), except that on the following products 35c. per cwt. may be added, universal and sheared carbon plates, hot rolled carbon sheets, hot rolled carbon bars and small shapes, galvanized, galvannealed, enameling and galvanized corrugated sheets, floor plates, hot rolled carbon strip and structural shapes.

Pending analysis of data to be submitted under provisions of this schedule, on standard pipe, seamless pipe, water well casing, large o. d. pipe, line pipe, wrought iron pipe, oil country tubular goods, and boiler and other pressure tubes in all cases where the rail and water rates to Pacific Coast ports are referred below these shall be disregarded and the maximum delivered prices on sales of above products at Pacific Coast points shall be the lowest prices resulting from that combination of base prices in effect April 16, 1941, and published all-rail carload freight from that mill basing point which gives the lowest delivered price to destination of customer plus such mark-up as is allowed for each product as set forth below in (i).

Pending analysis of data to be submitted to OPA, sellers located in Gulf Ports shall have a maximum delivered price as established in paragraphs (A), (B), (C), and (F) of this section based on sellers' prices in effect as of April 16, 1941.

Information from Pacific Coast and Gulf Port sellers is required to be filed with OPA on forms 149:1 and 149:2 respectively.

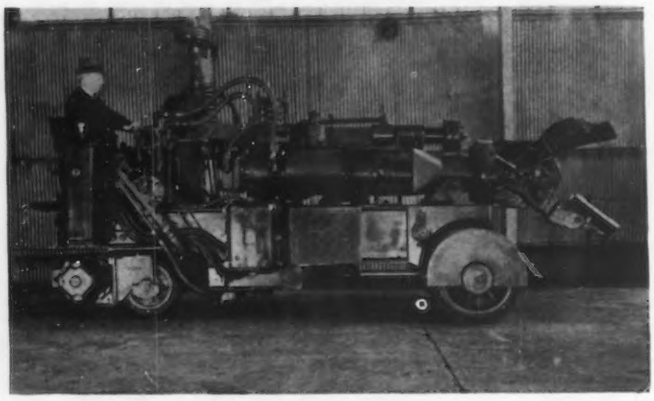
Copies of forms 149:1 and 149:2 may be had upon request by applying to the Office of Price Administration.

"Gulf Ports" means all cities and other places located on or near the Gulf of Mexico in the states of Texas, Louisiana, Mississippi, Alabama, and Florida.

Specific Wire Products

Notwithstanding the provisions of any other section of this schedule, the maximum delivered price of less-than-carload quantities of standard wire nails, annealed smooth wire, and galvanized smooth wire, in the city or free delivery area in which the seller is located, shall be the aggregate of: (a) Mill straight carload prices,

Attention!



Our 6000 Lb. Manipulator

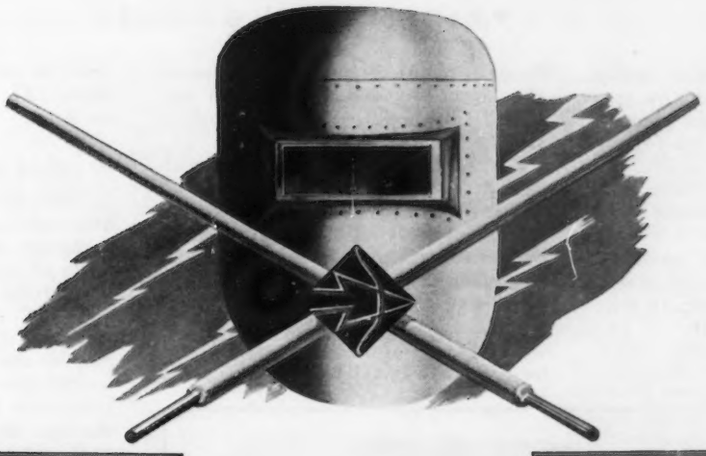
BROSIUS AUTO FLOOR MANIPULATOR

Built in capacities of from 2000 pounds to 15,000 pounds. The machine is self contained, requires no tracks or expensive runways, and its movement is not restricted to any definite path. It is driven by an electric motor, while tilting of the peel, operation of the tongs, and steering of the machine are accomplished through oil cylinders operated by a motor driven oil pump mounted on the machine. Extreme mobility is obtained, as the tractor unit turns 180°, permitting the machine to turn on its own wheel base—a feature of great importance where operating space is limited.

Edgar E. BROSIUS Inc.

MANUFACTURERS & DESIGNERS OF SPECIAL EQUIPMENT
FOR BLAST FURNACES AND STEEL MILLS
PITTSBURGH SHARPSBURG BRANCH, **PA.**

Brosius Equipment is covered by patents allowed and pending in the United States and Foreign Countries.



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ARCOS is throwing its every resource of production and research into the battle.

ARCOS CORPORATION
401 N. Broad St., Phila., Pa.

"QUALITY WELD METAL EASILY DEPOSITED"

Distributors Warehouse Stocks in the Following Cities:

ATLANTA, GA.	*J. M. Tull Metal & Supply Co.*
BUFFALO, N. Y.	*Root, Neal & Co.*
BORGER, TEXAS	*Hart Industrial Supply Co.*
BOSTON, MASS. (Belmont)	*H. Boker & Co., Inc.; W. E. Fluke*
CHICAGO, ILL.	*Machinery & Welder Corp.*
CINCINNATI, OHIO	*Williams & Co., Inc.*
CLEVELAND, OHIO	*Williams & Co., Inc.*
COLUMBUS, OHIO	*Williams & Co., Inc.*
DETROIT, MICHIGAN	*C. E. Phillips & Co., Inc.*
ERIE, PENNA.	*Boyd Welding Co.*
FT. WAYNE, IND.	*Wayne Welding Supply Co., Inc.*
HONOLULU, HAWAII	*Hawaiian Gas Products, Ltd.*
HOUSTON, TEXAS	*Champion Rivet Co. of Texas*
KANSAS CITY, MO.	*Welders Supply & Repair Co.*
KINGSPORT, TENN.	*Slip-Not Belting Corp.*
LOS ANGELES, CALIF.	*Ducommun Metals & Supply Co.*
MILWAUKEE, WIS.	*Machinery & Welder Corp.*
MOLINE, ILL.	*Machinery & Welder Corp.*
NEW YORK, N. Y.	*H. Boker & Co., Inc.*
OKLAHOMA CITY, OKLA.	*Hart Industrial Supply Co.*
PAMPA, TEXAS	*Hart Industrial Supply Co.*
PITTSBURGH, PA.	*Williams & Co., Inc.*
PORTLAND, OREGON	*Industrial Specialties Co.*
ROCHESTER, N. Y.	*Welding Supply Co.*
SAN FRANCISCO, CALIF.	*Ducommun Metals & Supply Co.*
SEATTLE, WASH.	*H. A. Cheever Co.*
ST. LOUIS, MO.	*Machinery & Welder Corp.*
SYRACUSE, N. Y.	*Welding Supply Co.*
TOLEDO, OHIO	*Williams & Co., Inc.*

(after deducting the regular jobber allowance of 15c. per cwt.) (b) carload freight from mill basing point to warehouse, and (c) one of the following: for standard wire nails, 50c. per cwt.; for annealed smooth wire, 60c. per cwt.; for galvanized smooth wire, 68c. per cwt.

The maximum delivered price of less-than-carload quantities of standard wire nails, annealed smooth wire and galvanized smooth wire at any other place, shall be the lowest delivered price that is the result of a combination of (a) the price (as computed above) of any seller located in any Listed City and (b) less-than-carload freight from such Listed City.

Extras charged by jobbers and dealers on merchant wire products shall be the same as regular published mill extras in effect as of April 16, 1941. Deductions customarily granted as of April 16, 1941, shall be deducted in computing the maximum delivered price.

(4) The maximum delivered prices for all other merchant wire products shall be computed as provided in sections (A), (B), (C) and (F) of this section.

Pipe and Tubular Products

Notwithstanding the provisions of any other section of this schedule, maximum delivered for the following types of iron and steel pipe and tubular products shall be as follows: Standard published mill extras which were charged as of April 16, 1941, may be computed in the maximum delivered price provided that where extras were listed but not customarily charged as of April 16, 1941, they shall not be charged. Deductions customarily granted as of April 16, 1941, shall be deducted in computing the maximum delivered price.

For standard pipe, seamless pipe, water well casing, large o. d. pipe and line pipe: The lowest price resulting from that combination of flat basing card discounts of the National Tube Co. in effect April 16, 1941, and published all-rail carload freight from basing point to destination of customer (except to Pacific Coast points where the rail and water rate is applicable) plus 25 per cent on standard pipe, reamed and drifted pipe and line pipe 6 in. and smaller, both black and galvanized, and 30 per cent on all larger sizes of standard pipe and line pipe, also all sizes of extra strong and double extra strong, both black and galvanized, and all sizes of water well casing and large o. d. pipe.

For wrought iron pipe: The price resulting from combination of resale discounts for sales from distributors' stocks as shown on A. M. Byers Co. card in effect April 16, 1941, and published all-rail carload freight from Pittsburgh to destination of customer (except to Pacific Coast points where the rail and water rate is applicable).

For oil country tubular goods: The lowest price resulting from that combination of basing point prices as published by Oil Well Supply Co., distributer for National Tube Co., in effect on April 16, 1941 (Oil Country Tubular Goods Price List No. 24), and carload freight or transportation charge of destination of customer as computed in National Tube Co. Freight Book No. 1.

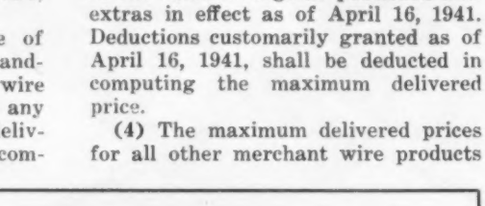
For boiler and other pressure tubes: the lowest price resulting from that combination of basing point prices in each quantity bracket of the National Tube Co. Price List for sales to consumer in effect April 16, 1941, and less-than-carload freight from basing point to destination of customer (carload freight shall be charged on shipments of 40,000 lb. and over).

For cold drawn seamless and other mechanical tubing: The prices in effect and actually charged as of April 16, 1941, by the exclusive distributors of the National Tube Co., covering all

(CONTINUED ON PAGE 200)

STOP ALL THE
WASTE
OF OLD-TIME
METAL CUTTING

★ WASTE OF TIME
★ WASTE OF POWER
★ WASTE OF LABOR
★ WASTE OF ENERGY
★ WASTE OF METAL



DO-ALL Contour Machine
BAND SAWING
BAND FILING
BAND POLISHING

4 CORNERS CUT IN 4 HOURS

With the DoAll a 4½" x 1½" cut was made in each corner of this 18" thick, 945-pound MO-LYB-DIE Hardtem B block. It took only one hour to notch each corner. The saw cut very straight and the job turned out beautifully.

Lansing Drop Forge Co.,
Lansing, Mich.

12 HOURS 40 MINUTES SAVED

Four pieces of Water Hardening Tool Steel 2" x 10" x 11" formerly done on shaper in 14 hours, now sawed on the DoAll in 1 hour and 20 minutes.

Swanson Tool & Machine Co., Erie, Pa.

SAVE WITH THE DoAll

This ultra-modern machine tool offers you the fastest, most efficient way of removing metal, any kind, from hardest high carbon steel to soft brass. Does internal and external band sawing, filing and polishing. The DoAll cuts corners all along the line—takes the place of shaper, milling and lathe work in industrial and defense plants everywhere.

Let us send a factory trained man to your plant to demonstrate just what a DoAll can save you.

FREE Literature and 158-page Handbook on Contour Machining. Send for copy today.

CONTINENTAL MACHINES, INC.
1311 S. WASHINGTON AVE., MINNEAPOLIS, MINN.

Associated with the DoAll Company, DesPlaines, Ill., Manufacturers of Band Saws and Band Files for DoAll Contour Machines.

Metals in 1941 . . . .

(CONTINUED FROM PAGE 57)

heavy melting steel has almost disappeared for the reason that during the depression period the steel mills turned out light products such as sheets and strip, and the consumers' goods made from these lighter products are commencing to return as No. 2 steel, No. 2 bundles, etc.

The record of the scrap industry in 1941 was considerably better than expectations, which is particularly commendatory in view of the kicking around the "scrappies" have taken from bureaucrats.

In 1941, total consumption of scrap, including home and purchased, was about 53,000,000 gross tons, Of this about 28,600,000 tons was home scrap and 24,400,000 tons purchased scrap. While there are no detailed statistics it is believed that the purchased or dealer scrap would break down into two equal parts. One would be railroad and prompt industrial scrap, and the other would be what is broadly called maintenance and obsolesence scrap, which would include scrap from auto wreckers, farms, collectors, and the general run of material passing through a dealer's yard. By comparison, the 53,000,000 gross tons of scrap consumed in 1941 stacks up against the previous record of about 41,000,000 tons in 1940 and the consumption of 27,000,000 tons in 1917, which was the peak year of the first World War. This record consumption in 1941 was accomplished partly by a pulling down of dealers' inventory. As of Dec. 31, 1941, the total inventory of suppliers was about 1,900,000 tons while on Oct. 31, the latest inventory, this was down to about 1,100,000 tons. On the whole, it can be said, very little actual iron and steel production was lost in 1941 due to a shortage of scrap.

For 1942 the OPM sings a song of woe, and bases its calculations upon a reduction of several million tons of purchased or dealers scrap. The writer does not share this pessimism, and while there are many who would disagree with him, it is believed that if it can be got out, there is enough scrap in this country to support the war program. A hasty survey being made of the railroads shows that they will offer about 10 per cent less scrap in 1942 than in 1941, and for the obvious reason that equipment which normally would be scrapped will be repaired. The amount of prompt scrap resulting from the processing of castings and the fabrication of finished steel into commodities should increase. In so-called normal times the conversion loss of steel is figured at about 13 per cent. For 1941 it could perhaps be figured at 16 per cent, and for 1942 the estimate is about 20 per cent. While the character of scrap will change greatly, nevertheless the processing of steel into shells and other materiel of war will develop more scrap than if the same tonnage were converted into automobiles, mechanical refrigerators, and other capital or consumers' goods.

The big question mark in scrap, and it represents about 50 per cent of the total of purchased scrap, is the "maintenance and obsolescence" classification. Probably on the 6,500,000 farms in this country, there is an average of one-fourth to one-half ton of scrap. To the 2,500,000 automobiles scrapped annually yielding about one ton of scrap each, there should perhaps be added at least 1,000,000 more units. On the other hand, the inability of industry to replace equipment and supplies will obviate the scrapping of many units that would normally come to dealers.

If sensible price action is taken as the situation develops, if moderate ingenuity is exercised, the writer finds it hard to believe that the consumption of scrap is going to vary greatly in 1942 from what it has in 1941. If the "scrappies" are permitted to do a job, quite likely they can get the necessary scrap out, and this perhaps does not necessarily mean an increase in price, but certainly a relaxation of certain inequalities in the schedule which discourage collection. And there also must be some compulsion to drive the additional 1,000,000 junkers off the grave yards into scrap dealers' yards.

And, to show what is meant by ingenuity, consider the re-working of old open hearth slag heaps. This, a practice common in Europe, would have been ignored in this country several years ago, but could perhaps be made to yield 1,000,000 tons of scrap in 1942 if OPM would talk less and act more.

There are several groups of men searching old records over the country to uncover the rich slag heaps of 50 years ago. Then, the amount of steel carried into the slag piles was quite sizeable, and frequently off-heats of steel went the same way. Steel content of such slag runs 4 or 5 per cent, and often up to 20 or 30 per cent in spots.

The equipment required is that of steam shovels, bulldozers, skull crackers, portable magnetic separators and tumbling barrels. The mode of operation is for the steam shovel to turn over the pile locating the large pieces, and in case of skulls lancing is usually required and sometimes dynamite. These large pieces are then conveyed to the skull cracker or crane ball drop for further preparation. The shovel in digging deposits all the material, except the very large pieces, on the grid of a magnetic separator which kicks out the exceptionally large pieces and feeds the smaller pieces over a conveyor system and magnetic pulley, thereby salvaging the small scrap. After this has been so separated, the material together with what is taken from the ball drop operation is placed in a tumbling barrel to dislodge as much as possible all adhering slag.

What is produced from an operation of this type is a prepared scrap having a metallic content in the neighborhood of 80 per cent. This content is determined by flotation test, using a formula as worked out and adjusted on the basis of experience.

Republic, for instance, started an operation of this character at the Chicago plant during the month of February, 1940, and during November and December of the same year started similar operations at the Gadsden and Warren plants. The tonnage from these first operations was in the neighborhood of 12,000 tons. During 1941, up to and including October, the recovery from these operations was roughly 49,000 tons, and it is judged this total will reach approximately 60,000 tons by the end of the year.

It is Republic's intention to increase this type of operation at various dumps that it controls with the expectation of reclaiming not less than 150,000 tons during 1942.

The most prominent concern doing this work is the Heckett Corp., Butler, Pa., which carries out the Republic operations, and just recently has signed contracts with

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January 1, 1942

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United States Pig Iron Production—*Thousands of Net Tons*

Including ferroalloys made in blast furnaces, but excluding charcoal iron. Source: THE IRON AGE

	Jan.	Feb.	Mar.	Apr.	May	June	½ Year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Second Half	Year
1901	1,301	1,270	1,433	1,408	1,500	1,476	8,388	1,523	1,496	1,456	1,548	1,526	1,418	8,967	17,355
1902	1,599	1,409	1,618	1,652	1,728	1,621	9,627	1,615	1,644	1,589	1,659	1,605	1,722	9,834	19,461
1903	1,649	1,558	1,668	1,801	1,920	1,874	10,470	1,732	1,760	1,741	1,596	1,163	949	8,941	19,411
1904	1,035	1,353	1,625	1,748	1,721	1,452	8,934	1,256	1,314	1,521	1,630	1,664	1,810	9,195	18,129
1905	1,996	1,789	2,168	2,153	2,200	2,007	12,313	1,951	2,065	2,127	2,229	2,256	2,292	12,990	25,303
1906	2,317	2,133	2,425	2,323	2,349	2,214	13,761	2,255	2,158	2,208	2,461	2,450	2,503	14,035	27,796
1907	2,471	2,290	2,493	2,485	2,571	2,503	14,813	2,527	2,520	2,446	2,506	2,047	1,382	13,428	28,241
1908	1,171	1,207	1,375	1,288	1,306	1,223	7,570	1,364	1,523	1,589	1,756	1,767	1,950	9,949	17,519
1909	2,014	1,912	2,056	1,948	2,109	2,162	12,201	2,355	2,519	2,671	2,912	2,853	2,952	16,262	28,263
1910	2,922	2,625	2,932	2,782	2,677	2,537	16,535	2,407	2,360	2,303	2,344	2,139	1,991	13,544	30,079
1911	1,971	2,011	2,433	2,314	2,121	2,004	12,854	2,008	2,158	2,214	2,355	2,240	2,288	13,263	26,117
1912	2,305	2,352	2,694	2,660	2,815	2,734	15,560	2,700	2,813	2,760	3,013	2,947	3,116	17,349	32,909
1913	3,130	2,896	3,096	3,083	3,161	2,945	18,311	2,867	2,852	2,807	2,852	2,501	2,222	16,101	34,412
1914	2,111	2,115	2,630	2,542	2,344	2,148	13,890	2,193	2,234	2,109	1,992	1,700	1,698	11,926	25,816
1915	1,793	1,887	2,312	2,370	2,535	2,667	13,564	2,871	3,114	3,195	3,501	3,401	3,587	19,669	33,233
1916	3,567	3,458	3,740	3,614	3,764	3,596	21,739	3,611	3,589	3,586	3,930	3,710	3,559	21,985	43,724
1917	3,529	2,963	3,642	3,735	3,827	3,662	21,358	3,743	3,538	3,510	3,699	3,591	3,229	21,410	42,768
1918	2,701	2,596	3,599	3,683	3,861	3,723	20,163	3,832	3,796	3,828	3,904	3,757	3,846	22,963	43,126
1919	3,699	3,293	3,461	2,775	2,361	2,369	17,958	2,721	3,072	2,787	2,087	2,679	2,949	16,295	34,253
1920	3,377	3,337	3,781	3,068	3,344	3,409	20,316	3,435	3,525	3,504	3,688	3,287	3,029	20,468	40,784
1921	2,705	2,169	1,788	1,336	1,368	1,193	10,559	969	1,069	1,104	1,396	1,585	1,847	7,970	18,529
1922	1,842	1,826	2,280	2,321	2,583	2,566	13,496	2,694	2,034	2,278	2,956	3,191	3,475	16,610	30,106
1923	3,617	3,353	3,947	3,976	4,332	4,117	23,342	4,119	3,864	3,501	3,527	3,241	3,272	21,524	44,866
1924	3,382	3,441	3,883	3,622	2,929	2,269	19,526	1,999	2,114	2,299	2,774	2,811	3,318	15,315	34,841
1925	3,774	3,600	3,992	3,650	3,283	2,995	21,294	2,984	3,030	3,052	3,386	3,386	3,640	19,478	40,772
1926	3,714	3,274	3,855	3,864	3,900	3,623	22,230	3,610	3,586	3,512	3,734	3,626	3,461	21,529	43,759
1927	3,477	3,294	3,901	3,832	3,798	3,461	21,763	3,305	3,300	3,108	3,118	2,966	3,020	18,817	40,580
1928	3,214	3,248	3,585	3,567	3,678	3,452	20,744	3,441	3,514	3,429	3,779	3,698	3,774	21,635	42,379
1929	3,855	3,591	4,160	4,102	4,366	4,163	24,237	4,239	4,207	3,918	4,019	3,563	3,177	23,133	47,360
1930	3,166	3,180	3,636	3,564	3,620	3,286	20,452	2,956	2,827	2,550	2,425	2,092	1,866	14,716	35,168
1931	1,920	1,912	2,276	2,261	2,233	1,836	12,438	1,639	1,435	1,309	1,314	1,235	1,098	8,030	20,468
1932	1,089	1,080	1,084	954	877	704	5,788	640	582	663	721	707	612	3,925	9,713
1935	637	621	607	699	993	1,417	4,974	2,007	2,053	1,705	1,519	1,215	1,323	9,822	14,796
1934	1,361	1,416	1,813	1,934	2,288	2,162	10,974	1,372	1,181	1,006	1,065	1,072	1,151	6,847	17,821
1935	1,654	1,802	1,983	1,863	1,934	1,739	10,975	1,702	1,972	1,990	2,215	2,315	2,360	12,554	23,529
1936	2,269	2,042	2,285	2,693	2,966	2,896	15,151	2,905	3,037	3,058	3,351	3,301	3,489	19,141	34,292
1937	3,597	3,359	3,874	3,799	3,960	3,481	22,072	3,919	4,039	3,819	3,239	2,248	1,669	18,933	41,005
1938	1,601	1,454	1,627	1,541	1,406	1,189	8,818	1,346	1,673	1,882	2,298	2,543	2,476	12,218	21,036
1939	2,436	2,307	2,682	2,303	1,924	2,373	14,025	2,639	2,979	3,224	4,063	4,167	4,220	21,292	35,317
1940	4,032	3,311	3,270	3,137	3,514	3,819	21,083	4,054	4,238	4,177	4,446	4,403	4,548	25,866	46,949
1941	4,664	4,198	4,704	4,334	4,600	4,553	27,053	4,771	4,791	4,717	4,856	4,703	*4,858	*28,696	*55,748

*Estimate

Photo by McCord Radiator & Mfg. Co.

Official U. S. Signal Corps photo

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DEVILBISS SPRAY SYSTEMS

Composite Pig Iron Price

Average of THE IRON AGE quotations on basic pig iron at Valley furnace and foundry iron at Chicago, Birmingham, Buffalo, Valley and Philadelphia, quoted in gross tons.

	1924	1925	1926	1927	1928	1929
January	$22.15	$22.44	$21.79	$19.44	$17.63	$18.43
February	22.84	22.50	21.77	19.07	17.73	18.38
March	22.81	21.99	21.65	19.03	17.73	18.36
April	22.31	20.95	20.96	19.21	17.67	18.52
May	21.40	19.85	20.69	19.09	17.45	18.70
June	20.27	19.22	20.00	18.92	17.23	18.65
July	19.31	18.96	19.51	18.56	17.10	18.48
August	19.40	19.01	19.46	18.17	17.11	18.39
September	19.46	19.39	19.46	18.03	17.54	18.27
October	19.46	19.92	19.69	17.96	17.94	18.33
November	19.79	21.16	20.13	17.59	18.46	18.36
December	21.60	21.54	19.94	17.55	18.51	18.24
Average	20.90	20.58	20.42	18.55	17.68	18.43

	1930	1931	1932	1933	1934	1935
January	$18.19	$15.90	$14.68	$13.56	$16.90	$17.90
February	18.02	15.60	14.51	13.56	16.90	17.90
March	17.75	15.71	14.45	13.56	16.90	17.90
April	17.73	15.79	14.35	13.76	17.07	17.90
May	17.60	15.76	14.12	14.48	17.90	17.85
June	17.48	15.62	14.01	15.01	17.90	17.84
July	17.16	15.56	13.76	15.50	17.90	17.84
August	16.90	15.51	13.69	16.09	17.90	17.84
September	16.70	15.44	13.64	16.71	17.90	17.84
October	16.31	15.21	13.63	16.61	17.90	17.87
November	16.21	14.97	13.59	16.61	17.90	18.84
December	15.95	14.86	13.56	16.90	17.90	18.84
Average	17.17	15.51	14.00	15.20	17.58	18.03

	1936	1937	1938	1939	1940	1941
January	$18.84	$20.25	$23.25	$20.61	$22.61	$23.45
February	18.84	20.50	23.25	20.61	22.61	23.45
March	18.84	22.85	23.25	20.61	22.61	23.53
April	18.84	23.25	23.25	20.61	22.61	23.61
May	18.84	23.25	23.25	20.61	22.61	23.61
June	18.84	23.25	22.98	20.61	22.61	23.61
July	18.84	23.25	19.61	20.61	22.61	23.61
August	18.73	23.25	19.61	20.61	22.61	23.61
September	18.73	23.25	19.82	21.61	22.61	23.61
October	18.73	23.25	20.57	22.61	22.61	23.61
November	18.98	23.25	20.61	22.61	22.61	23.61
December	19.73	23.25	20.61	22.61	22.95	23.61
Average	18.90	22.74	21.67	21.19	22.64	23.58

Lake Superior Charcoal Pig Iron, at Chicago, Gross Ton

	1929	1931	1932	1933	1934	1935
January	$27.04	$27.04	$23.17	$23.17	$23.54	$24.04
February	27.04	27.04	23.17	23.17	23.54	24.04
March	27.04	26.24	23.17	23.17	23.54	24.04
April	27.04	25.04	23.17	23.17	24.79	24.13
May	27.04	25.04	23.17	23.17	24.04	24.25
June	27.04	25.04	23.17	23.17	24.04	24.25
July	27.04	25.04	23.17	23.17	24.04	24.25
August	27.04	25.04	23.17	23.17	24.04	24.25
September	27.04	25.04	23.17	23.67	24.04	24.25
October	27.04	25.04	23.17	23.54	24.04	24.85
November	27.04	25.04	23.17	23.54	24.04	25.25
December	27.04	23.04	23.17	23.54	24.04	25.25
Average	27.04	25.31	23.17	23.30	23.98	24.35

	1936	1937	1938	1939	1940	1941
January	$25.25	$26.54	$30.24	$28.34	$30.34	$30.34
February	25.25	26.79	30.24	28.34	30.34	30.34
March	25.25	29.44	30.24	28.34	30.34	30.34
April	25.25	30.04	30.32	28.34	30.34	30.34
May	25.25	30.04	30.34	28.34	30.34	31.09
June	25.25	30.04	30.34	28.34	30.34	31.34
July	25.25	30.04	28.34	28.34	30.34	31.34
August	25.25	30.04	28.34	28.34	30.34	31.34
September	25.25	30.04	28.34	29.34	30.34	31.34
October	25.25	30.04	28.34	30.34	30.34	31.34
November	25.50	30.16	28.34	30.34	30.34	31.34
December	26.25	30.24	28.34	30.34	30.34	31.34
Average	25.35	29.45	29.31	28.92	30.34	30.99

The Iron Age

Basic Pig Iron at Mahoning or Shenango Valley Furnace, Gross Ton

	1929	1931	1932	1933	1934	1935
January	$17.50	$17.00	$15.00	$13.50	$17.00	$18.00
February	17.50	16.75	14.62	13.50	17.00	18.00
March	17.50	16.50	14.50	13.50	17.00	18.00
April	17.90	16.50	14.50	13.50	17.25	18.00
May	18.38	16.25	14.20	14.20	18.00	18.00
June	18.50	15.50	14.00	15.00	18.00	18.00
July	18.50	15.50	13.50	15.50	18.00	18.00
August	18.50	15.50	13.50	16.20	18.00	18.00
September	18.50	15.50	13.50	17.00	18.00	18.00
October	18.50	15.25	13.50	17.00	18.00	18.00
November	18.50	15.00	13.50	17.00	18.00	19.00
December	18.50	15.00	13.50	17.00	18.00	19.00
Average	18.19	15.85	13.98	15.24	17.69	18.17

	1936	1937	1938	1939	1940	1941
January	$19.00	$20.50	$23.50	$20.50	$22.50	$23.50
February	19.00	20.75	23.50	20.50	22.50	23.50
March	19.00	23.10	23.50	20.50	22.50	23.50
April	19.00	23.50	23.50	20.50	22.50	23.50
May	19.00	23.50	23.50	20.50	22.50	23.50
June	19.00	23.50	22.70	20.50	22.50	23.50
July	19.00	23.50	19.50	20.50	22.50	23.50
August	19.00	23.50	19.50	20.50	22.50	23.50
September	19.00	23.50	19.75	21.50	22.50	23.50
October	19.00	23.50	20.50	22.50	22.50	23.50
November	19.25	23.50	20.50	22.50	22.50	23.50
December	20.00	23.50	20.50	22.50	22.90	23.50
Average	19.10	22.99	21.70	21.09	22.53	23.50

QUALITY CASTINGS SINCE 1905

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Complete facilities for a wide range of commercial forgings

No. 2 Foundry Pig Iron at Buffalo Furnace, Gross Ton

	1929	1931	1932	1933	1934	1935
January	$18.00	$17.50	$16.00	$16.00	$17.50	$18.50
February	18.39	17.50	16.00	16.00	17.50	18.50
March	18.50	17.50	16.00	16.00	17.50	18.50
April	18.50	17.50	16.00	16.00	17.50	18.50
May	18.50	17.13	16.00	16.00	18.50	18.50
June	18.75	17.00	16.00	16.00	18.50	18.50
July	19.50	17.00	16.00	16.50	18.50	18.50
August	19.50	17.00	16.00	17.10	18.50	18.50
September	19.50	17.00	16.00	17.50	18.50	18.50
October	19.50	17.00	16.00	17.50	18.50	18.50
November	19.50	17.00	16.00	17.50	18.50	19.50
December	19.50	16.80	16.00	17.50	18.50	19.50
Average	18.97	17.16	16.00	16.63	18.17	18.67

	1936	1937	1938	1939	1940	1941
January	$19.50	$21.00	$24.00	$21.00	$23.00	$24.00
February	19.50	21.25	24.00	21.00	23.00	24.00
March	19.50	23.60	24.00	21.00	23.00	24.00
April	19.50	24.00	24.00	21.00	23.00	24.00
May	19.50	24.00	24.00	21.00	23.00	24.00
June	19.50	24.00	23.20	21.00	23.00	24.00
July	19.50	24.00	20.00	21.00	23.00	24.00
August	19.50	24.00	20.00	21.00	23.00	24.00
September	19.50	24.00	20.13	22.00	23.00	24.00
October	19.50	24.00	20.88	23.00	23.00	24.00
November	19.75	24.00	21.00	23.00	23.00	24.00
December	20.50	24.00	21.00	23.00	23.40	24.00
Average	19.60	23.49	22.18	21.59	23.03	24.00

No. 2 Foundry Pig Iron at Mahoning or Shenango Valley Furnace, Gross Ton

	1929	1931	1932	1933	1934	1935
January	$17.50	$17.00	$15.50	$14.50	$17.50	$18.50
February	17.50	16.75	15.12	14.50	17.50	18.50
March	17.75	16.50	15.00	14.50	17.50	18.50
April	18.00	17.00	15.00	14.50	17.75	18.50
May	18.50	17.00	14.70	14.70	18.50	18.50
June	18.50	17.00	14.50	15.50	18.50	18.50
July	18.50	17.00	14.50	16.00	18.50	18.50
August	18.50	17.00	14.50	16.70	18.50	18.50
September	18.50	17.00	14.50	17.50	18.50	18.50
October	18.50	16.63	14.50	17.50	18.50	18.50
November	18.50	16.00	14.50	17.50	18.50	19.50
December	18.50	15.70	14.50	17.50	18.50	19.50
Average	18.23	16.72	14.73	15.91	18.19	18.67

	1936	1937	1938	1939	1940	1941
January	$19.50	$21.00	$24.00	$21.00	$23.00	$24.00
February	19.50	21.25	24.00	21.00	23.00	24.00
March	19.50	23.60	24.00	21.00	23.00	24.00
April	19.50	24.00	24.00	21.00	23.00	24.00
May	19.50	24.00	24.00	21.00	23.00	24.00
June	19.50	24.00	23.20	21.00	23.00	24.00
July	19.50	24.00	20.00	21.00	23.00	24.00
August	19.50	24.00	20.00	21.00	23.00	24.00
September	19.50	24.00	20.25	22.00	23.00	24.00
October	19.50	24.00	21.00	23.00	23.00	24.00
November	19.75	24.00	21.00	23.00	23.00	24.00
December	20.50	24.00	21.00	23.00	23.40	24.00
Average	19.60	23.49	22.20	21.59	23.03	24.00

The Iron Age

No. 2 Foundry Pig Iron at Chicago Furnace, Gross Ton

	1929	1931	1932	1933	1934	1935
January	$20.00	$17.50	$16.50	$15.50	$17.50	$18.50
February	20.00	17.50	16.50	15.50	17.50	18.50
March	20.00	17.50	16.50	15.50	17.50	18.50
April	20.00	17.50	16.00	15.50	17.75	18.50
May	20.00	17.50	16.00	15.80	18.50	18.50
June	20.00	17.50	16.00	16.00	18.50	18.50
July	20.00	17.50	15.50	16.78	18.50	18.50
August	20.00	17.50	15.50	17.10	18.50	18.50
September	20.00	17.50	15.50	17.50	18.50	18.50
October	20.00	17.00	15.50	17.50	18.50	18.70
November	20.00	17.00	15.50	17.50	18.50	19.50
December	20.00	16.70	15.50	17.50	18.50	19.50
Average	20.00	17.35	15.87	16.47	18.19	18.68

	1936	1937	1938	1939	1940	1941
January	$19.50	$21.00	$24.00	$21.00	$23.00	$24.00
February	19.50	21.25	24.00	21.00	23.00	24.00
March	19.50	23.60	24.00	21.00	23.00	24.00
April	19.50	24.00	24.00	21.00	23.00	24.00
May	19.50	24.00	24.00	21.00	23.00	24.00
June	19.50	24.00	23.20	21.00	23.00	24.00
July	19.50	24.00	20.00	21.00	23.00	24.00
August	19.50	24.00	20.00	21.00	23.00	24.00
September	19.50	24.00	20.25	22.00	23.00	24.00
October	19.50	24.00	21.00	23.00	23.00	24.00
November	19.75	24.00	21.00	23.00	23.00	24.00
December	20.50	24.00	21.00	23.00	23.40	24.00
Average	19.60	23.49	22.20	21.59	23.03	24.00

The Iron Age

No. 2 Foundry Pig Iron at Granite City, Ill., Furnace, Gross Ton

	1929	1931	1932	1933	1934	1935
January	$20.75	$18.25	$18.33	$18.33	$17.50	$18.50
February	20.75	18.25	18.33	18.33	17.50	18.50
March	20.75	18.25	18.33	18.33	17.50	18.50
April	20.75	18.25	18.33	17.34	17.75	18.50
May	20.75	18.25	18.33	16.55	18.50	18.50
June	20.75	18.25	18.33	16.85	18.50	18.50
July	20.75	18.25	18.33	17.35	18.50	18.50
August	20.69	18.25	18.33	17.85	18.50	18.50
September	20.50	18.25	18.33	17.50	18.50	18.50
October	20.50	18.25	18.33	17.50	18.50	18.70
November	20.50	18.25	18.33	17.50	18.50	19.50
December	20.50	18.25	18.33	17.50	18.50	19.50
Average	20.66	18.25	18.33	17.58	18.19	18.68

	1936	1937	1938	1939	1940	1941
January	$19.50	$21.00	$24.00	$21.00	$23.00	$24.00
February	19.50	21.25	24.00	21.00	23.00	24.00
March	19.50	23.60	24.00	21.00	23.00	24.00
April	19.50	24.00	24.00	21.00	23.00	24.00
May	19.50	24.00	24.00	21.00	23.00	24.00
June	19.50	24.00	23.20	21.00	23.00	24.00
July	19.50	24.00	20.00	21.00	23.00	24.00
August	19.50	24.00	20.00	21.00	23.00	24.00
September	19.50	24.00	20.25	22.00	23.00	24.00
October	19.50	24.00	21.00	23.00	23.00	24.00
November	19.75	24.00	21.00	23.00	23.00	24.00
December	20.50	24.00	21.00	23.00	23.50	24.00
Average	19.60	23.49	22.20	21.59	23.04	24.00

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All Types--All Sizes

Gairing counterbores, countersinks, back spotfacers and core drills, (cutters, holders and complete assemblies) are supplied in high speed interchangeable, solid, adjustable and inserted blade types. Large stocks available. Special sizes to order. Our modern facilities are backed by a quarter century of specialized experience. *Make use of them.*

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The GAIRING TOOL CO., Detroit, Michigan
In Canada: Hi-Speed Tools Ltd., Galt, Ont.

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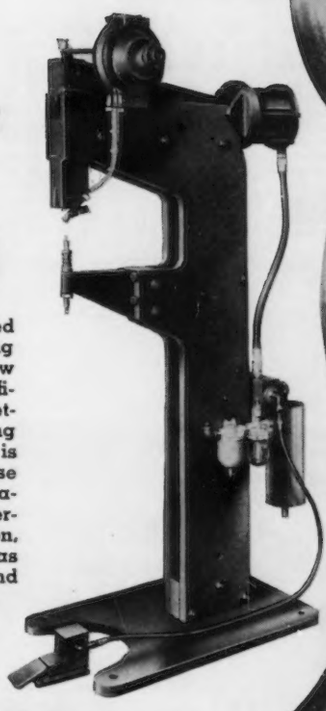
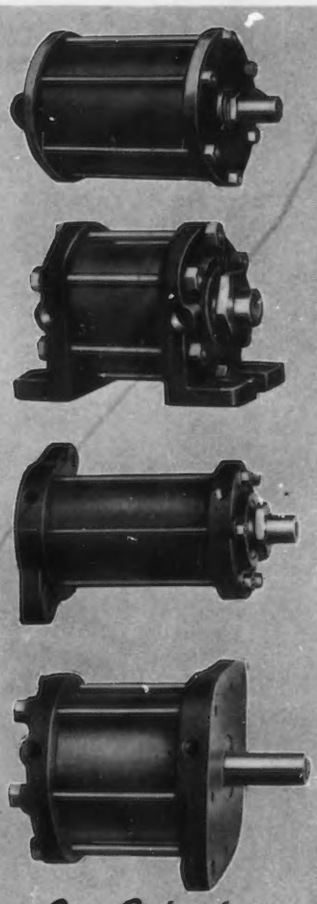
New

TOMKINS-JOHNSON
Air Powered
RIVITOR

Furnishes "air squeeze" action combined with automatic feed riveting. In keeping with established T-J quality, this new RIVITOR contains many cost-cutting, efficiency building features—feeding and setting mechanisms are automatic . . . setting tools are adjustable . . . horn section is interchangeable. Steel side plates, base plate and non-repeating foot pedal operations, are other "pluses". By using a different type rivet set and jaw construction, Counter Sunk Head rivets are handled, as well as Flat Head, Round Head, Full and Semi-Brazier Head Rivets. This new, high production T-J Air Powered Rivitor is your best choice for work within its range . . . write for production data prices and deliveries, address to Dept. I.





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Increased performance and machine efficiency, plus greater handling convenience, are a few of the many advantages T-J products bring to machines and equipment engaged in today's high pressure defense production requirements.

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T-J AIR CYLINDERS

These units exert power movement from 100 lbs. to 12,000 lbs. (direct). Made in styles, sizes and strokes to meet your requirements.

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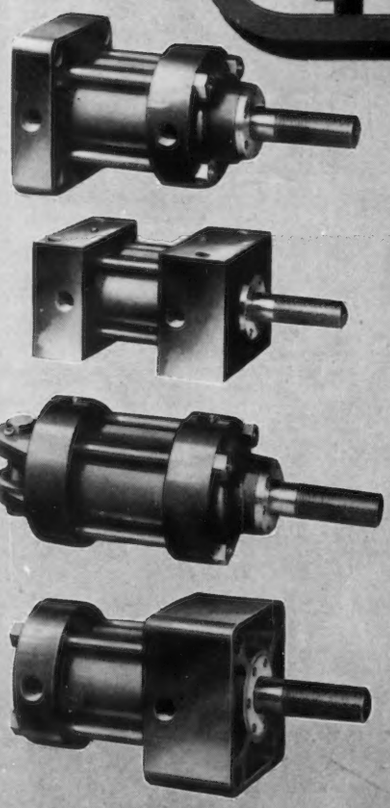


Hydraulic Cylinders

THE TOMKINS-JOHNSON CO.

Jackson . . . Michigan

Southern No. 2 Foundry Pig Iron at Birmingham, Gross Ton

	1929	1931	1932	1933	1934	1935
January	$16.50	$13.80	$11.50	$11.00	$13.50	$14.50
February	16.50	12.88	11.00	11.00	13.50	14.50
March	16.00	12.38	11.00	11.00	13.50	14.50
April	15.40	12.00	11.00	11.25	13.50	14.50
May	15.00	12.00	11.00	12.00	14.30	14.50
June	15.00	12.00	11.00	12.00	14.50	14.50
July	14.63	12.00	11.00	12.50	14.50	14.50
August	14.50	12.00	11.00	13.10	14.50	14.50
September	14.50	12.00	11.00	13.50	14.50	14.50
October	14.50	12.00	11.00	13.50	14.50	14.50
November	14.50	12.00	11.00	13.50	14.50	14.75
December	14.50	12.00	11.00	13.50	14.50	15.50
Average	15.13	12.27	11.04	12.32	14.15	14.60

	1936	1937	1938	1939	1940	1941
January	$15.50	$17.38	$20.38	$17.38	$19.38	$19.38
February	15.50	17.63	20.38	17.38	19.38	19.38
March	15.50	19.98	20.38	17.38	19.38	19.89
April	15.50	20.38	20.38	17.38	19.38	20.38
May	15.50	20.38	20.38	17.38	19.38	20.38
June	15.50	20.38	19.58	17.38	19.38	20.38
July	15.50	20.38	16.38	17.38	19.38	20.38
August	*15.88	20.38	16.38	17.38	19.38	20.38
September	15.88	20.38	16.63	18.38	19.38	20.38
October	15.88	20.38	17.38	19.38	19.38	20.38
November	16.13	20.38	17.38	19.38	19.38	20.38
December	16.88	20.38	17.38	19.38	19.38	20.38
Average	15.76	19.87	18.58	17.96	19.38	20.17

* Beginning August, 1936, 38c. a ton deducted for 0.70 phosphorus and over.

Malleable Pig Iron at Mahoning or Shenango Valley Furnace, Gross Ton

	1929	1930	1931	1932	1933	1934
January	$18.00	$19.00	$17.50	$16.00	$14.50	$17.50
February	18.00	19.00	17.25	15.62	14.50	17.50
March	18.25	19.00	17.00	15.50	14.50	17.50
April	18.50	19.00	17.00	15.50	14.50	17.75
May	19.00	19.00	17.00	15.20	14.70	18.50
June	19.00	19.00	17.00	15.00	15.50	18.50
July	19.00	18.60	17.00	14.50	16.00	18.50
August	19.00	18.50	17.00	14.50	16.70	18.50
September	19.00	18.30	17.00	14.50	17.50	18.50
October	19.00	17.75	16.88	14.50	17.50	18.50
November	19.00	17.50	16.50	14.50	17.50	18.50
December	19.00	17.50	16.20	14.50	17.50	18.50
Average	18.73	18.51	16.94	14.98	15.91	18.19

	1935	1936	1937	1938	1939	1940	1941
January	$18.50	$19.50	$21.00	$24.00	$21.00	$23.00	$24.00
February	18.50	19.50	21.25	24.00	21.00	23.00	24.00
March	18.50	19.50	23.60	24.00	21.00	23.00	24.00
April	18.50	19.50	24.00	24.00	21.00	23.00	24.00
May	18.50	19.50	24.00	24.00	21.00	23.00	24.00
June	18.50	19.50	24.00	23.20	21.00	23.00	24.00
July	18.50	19.50	24.00	20.00	21.00	23.00	24.00
August	18.50	19.50	24.00	20.00	21.00	23.00	24.00
September	18.50	19.50	24.00	20.25	22.00	23.00	24.00
October	18.50	19.50	24.00	21.00	23.00	23.00	24.00
November	19.50	19.75	24.00	21.00	23.00	23.00	24.00
December	19.50	20.50	24.00	21.00	23.00	23.50	24.00
Average	18.67	19.60	23.49	22.20	21.59	23.04	24.00

—The Iron Age—

Lake Superior Iron Ores, Per Gross Ton, at Lake Erie Ports

	Bessemer Ores			
	Analysis Guarantee		Price	
	Iron Natural	Phosphorus Dry	Old Range	Mesaba
1914	55.00	0.045	$3.75	$3.50
1915	55.00	0.045	3.75	3.45
1916	55.00	0.045	4.45	4.20
1917	55.00	0.045	5.95	5.70
1918 to July 1	55.00	0.045	5.95	5.70
1918–July 1 to Sept. 30	55.00	0.045	6.40	6.15
1918–Oct. 1 to Close	55.00	0.045	6.65	6.40
1919	55.00	0.045	6.45	6.20
1920	55.00	0.045	7.45	7.20
1921	55.00	0.045	6.45	6.20
1922	55.00	0.045	5.95	5.70
1923	55.00	0.045	6.45	6.20
1924	55.00	0.045	4.65	5.40
1925 through 1928	51.50	0.045	4.55	4.40
1929 through 1936	51.50	0.045	4.80	4.65
1937 to April 15, 1940	51.50	0.045	5.25	5.10
1940–April 16 to Close	51.50	0.045	4.75	4.60
1941	51.50	0.045	4.75	4.60

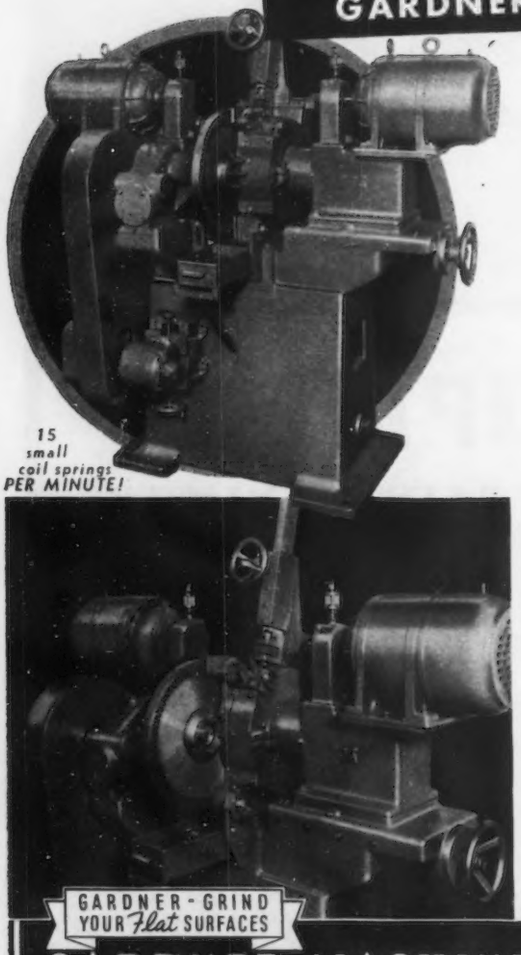
	Non-Bessemer Ores			
	Analysis Guarantee	Price		
	Iron Natural	Old Range	Mesaba	High Phosphorus
1914	51.50	$3.00	$2.85	....
1915	51.50	3.00	2.80	....
1916	51.50	3.70	3.55	....
1917	51.50	5.20	5.05	....
1918 to July 1	51.50	5.20	5.05	....
1918–July 1 to Sept. 30	51.50	5.65	5.50	....
1918–Oct. 1 to Close	51.50	5.90	5.75	....
1919	51.50	5.70	5.55	$5.35
1920	51.50	6.70	6.55	6.35
1921	51.50	5.70	5.55	5.35
1922	51.50	5.20	5.05	4.85
1923	51.50	5.70	5.55	5.35
1924	51.50	4.90	4.75	4.55
1925 through 1928	51.50	4.40	4.25	4.15
1929 through 1936	51.50	4.65	4.50	4.40
1937 to April 15, 1940	51.50	5.10	4.95	4.85
1940–April 16 to Close	51.50	4.60	4.45	4.35
1941	51.50	4.60	4.45	4.35

—The Iron Age—

Lake Superior Iron Ore Shipments Water Movement, Gross Tons

1929	1931	1932	1933
65,204,600	23,467,786	3,567,985	21,623,898
1934	**1935**	**1936**	**1937**
22,249,600	28,362,368	44,822,023	62,598,836
1938	**1939**	**1940**	**1941**
19,263,011	45,072,725	63,712,982	80,116,360

Speed production of small parallel-surface parts *with this* 12" Double-Head GARDNER GRINDER!



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MANY of your small parallel-surface jobs — "hex" nuts, bearing rollers, pins, spacers, gear blanks, fire-arms parts, or coil springs like those illustrated here — can be ground with surprising economies on a Gardner No. 77A—12" Double Spindle Grinder, or a similar tool.

The rotary-carrier method of fixturing, as shown, is exceptionally productive, although several types of purely hand-operated fixtures may also be mounted on one of these machines.

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Check the possibilities of this equipment on your own parallel-surface parts—

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As in the case of modern travel, there are usually more ways than one of doing things . . . each with advantages of its own. And never has this fact been more appreciated than today. Typical example is the manufacturer whose supply of parts made of aluminum and certain other materials has been tied up by defense needs. Often, his search for a satisfactory substitute has ended with pressed steel. For, when properly designed, pressed steel affords light weight, great strength and other high physical properties. Transue has lent every effort of its extensive facilities for designing and producing steel stampings to the solution of this problem.

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Scrap Steel Composite Price

Average of THE IRON AGE *quotations on No. 1 heavy melting scrap at Pittsburgh, Chicago and Philadelphia—Gross ton.*

	1929	1930	1931	1932	1933	1934	1935
January	$17.02	$14.65	$11.30	$8.41	$6.77	$11.73	$12.29
February	16.96	14.92	11.15	8.27	6.83	12.25	11.98
March	16.71	14.88	11.10	8.23	6.96	12.82	11.06
April	17.18	14.30	10.83	8.12	7.73	12.54	10.46
May	16.54	13.71	9.94	7.48	9.70	11.57	10.70
June	16.39	13.31	9.39	6.89	9.97	10.67	10.74
July	16.60	13.08	9.25	6.46	11.27	10.53	10.96
August	16.86	13.29	9.25	6.93	12.08	10.15	12.25
September	16.60	13.70	9.12	7.69	11.35	9.63	12.71
October	15.78	12.77	8.78	7.62	10.56	9.54	12.67
November	14.83	11.69	8.74	7.45	9.94	10.04	12.90
December	14.15	11.28	8.61	6.92	10.50	11.43	13.33
Average	16.30	13.46	9.80	7.54	9.47	11.07	11.85

	1936	1937	1938	1939	1940	1941
January	$13.47	$18.33	$14.00	$14.94	$17.58	$20.88
February	14.12	19.27	13.86	15.01	16.88	20.08
March	14.75	21.25	13.46	15.20	16.56	20.29
April	14.59	21.02	12.40	14.77	16.14	19.22
May	13.39	18.54	11.54	14.17	17.60	19.17
June	12.81	17.28	11.32	14.71	19.31	19.17
July	13.29	18.79	13.29	14.92	18.47	19.17
August	15.04	20.43	14.51	15.43	18.72	19.17
September	16.45	18.73	14.34	18.32	19.91	19.17
October	16.63	15.89	14.21	21.48	20.63	19.17
November	16.31	13.34	14.74	19.66	20.83	19.17
December	17.10	13.46	14.88	18.05	21.42	19.17
Average	14.83	18.03	13.54	16.39	18.67	19.49

No. 1 Heavy Melting Steel Scrap at Pittsburgh, Gross Ton

	1929	1931	1932	1933	1934	1935
January	$19.31	$13.19	$10.22	$8.30	$13.00	$13.35
February	18.63	12.88	10.25	8.50	14.00	13.06
March	18.44	12.80	10.25	8.88	14.44	12.19
April	18.60	12.39	10.12	10.00	14.19	11.55
May	17.88	11.25	9.60	11.75	12.80	11.62
June	18.25	10.30	8.75	11.75	11.75	11.75
July	18.55	10.56	8.25	12.72	11.75	11.95
August	19.00	10.69	8.60	13.85	11.31	12.94
September	18.31	10.65	9.54	12.94	10.75	13.25
October	17.30	10.22	9.62	12.15	10.35	13.40
November	16.39	10.22	9.15	11.50	10.94	13.56
December	15.45	10.25	8.75	12.13	13.01	14.05
Average	18.01	11.28	9.42	11.21	12.36	12.72

	1936	1937	1938	1939	1940	1941
January	$14.44	$19.50	$14.25	$15.72	$18.35	$22.13
February	14.96	19.81	14.13	15.72	17.50	21.00
March	15.75	23.15	13.67	15.97	16.88	21.00
April	15.75	22.25	12.44	15.31	16.55	20.20
May	14.50	19.38	11.50	14.48	18.37	20.00
June	13.57	18.45	11.30	15.12	20.06	20.00
July	14.19	19.75	14.25	15.56	19.10	20.00
August	15.94	21.85	15.45	16.15	18.56	20.00
September	17.80	19.62	15.25	19.88	20.00	20.00
October	17.87	16.62	15.00	23.05	21.45	20.00
November	17.31	13.75	15.28	20.56	21.69	20.00
December	18.31	13.75	15.75	18.58	22.28	20.00
Average	15.87	18.86	14.02	17.17	19.23	20.36

—The Iron Age—

No. 1 Heavy Melting Steel Scrap at Chicago, Gross Ton

	1929	1931	1932	1933	1934	1935
January	$15.39	$10.27	$7.50	$5.25	$10.50	$11.80
February	15.88	10.06	7.25	5.25	11.00	11.25
March	15.66	10.00	7.25	5.25	12.13	10.50
April	15.95	9.81	7.14	6.00	11.75	9.85
May	15.39	8.88	6.45	8.45	11.05	10.06
June	14.94	8.75	5.69	8.91	9.75	9.97
July	14.75	8.75	4.88	10.42	9.55	10.35
August	15.06	8.38	5.75	10.46	9.19	12.38
September	15.13	8.20	6.25	9.84	8.50	12.50
October	14.30	8.00	6.00	9.47	8.75	12.50
November	13.15	8.00	5.93	8.60	9.25	13.00
December	12.50	7.80	5.25	8.94	10.50	13.25
Average	14.84	8.91	6.28	8.07	10.16	11.45

	1936	1937	1938	1939	1940	1941
January	$13.37	$17.81	$13.00	$13.87	$16.38	$20.00
February	14.19	19.25	12.69	13.94	15.75	19.25
March	14.75	20.60	12.15	14.25	15.69	19.88
April	14.34	20.56	11.37	13.37	15.33	18.95
May	12.87	17.12	11.00	12.75	17.00	18.75
June	12.85	15.70	10.45	13.45	18.19	18.75
July	13.37	17.62	12.00	13.50	17.35	18.75
August	15.19	19.70	13.75	13.87	18.03	18.75
September	16.15	17.56	13.50	16.22	19.22	18.75
October	16.25	14.69	12.88	19.16	19.75	18.75
November	16.50	12.50	14.20	17.85	20.06	18.75
December	17.00	12.38	13.75	16.67	20.60	18.75
Average	14.74	17.12	12.56	14.91	17.73	19.01

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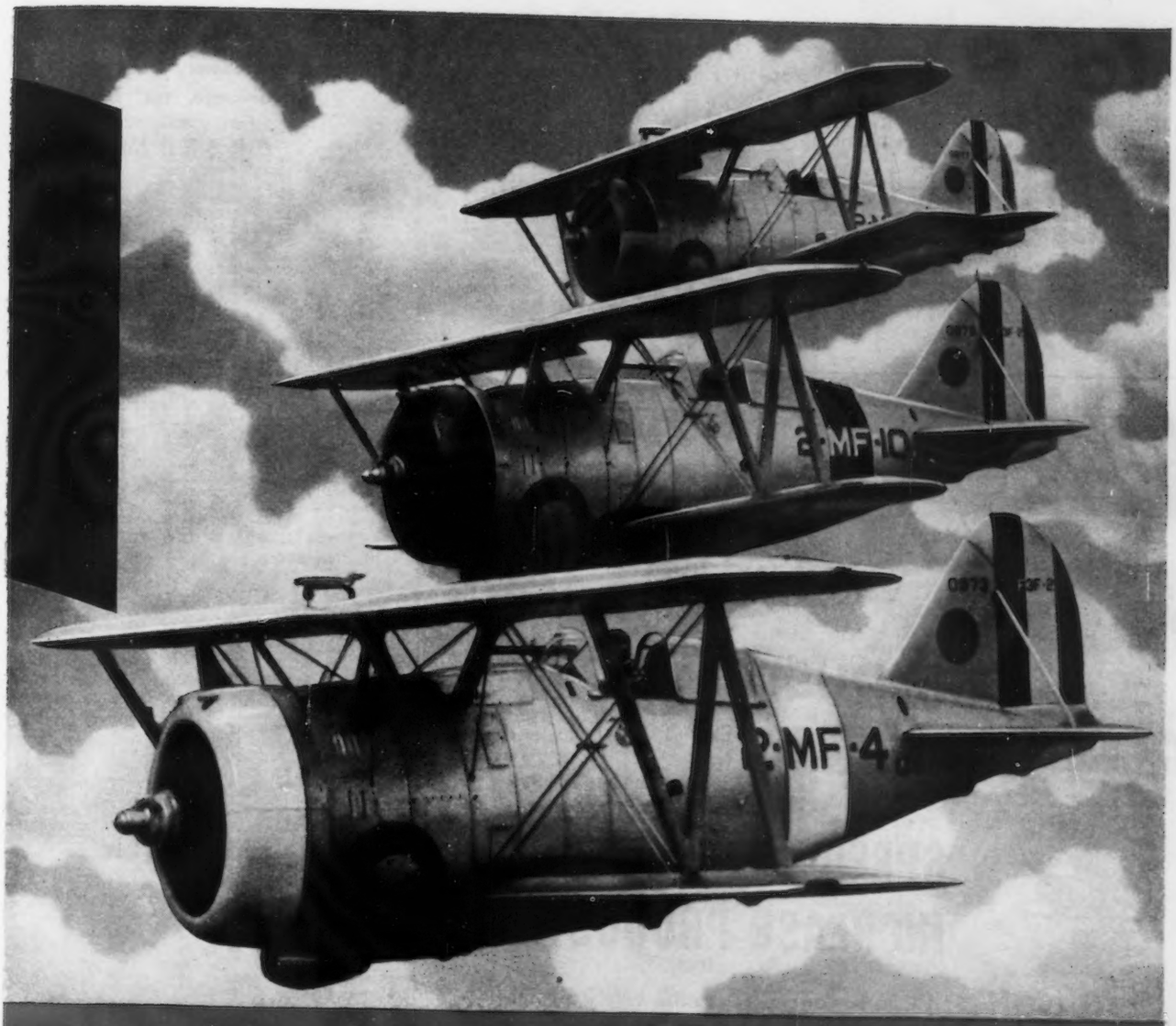

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MOTORS FARM EQUIPMENT WASHERS-IRONERS STOKERS AIR CONDITIONERS

No. 1 Heavy Melting Steel Scrap, at Philadelphia, Gross Ton

	1929	1931	1932	1933	1934	1935
January	$16.39	$10.50	$7.00	$6.75	$11.70	$11.40
February	16.39	10.50	7.00	6.75	11.75	11.62
March	16.13	10.50	7.00	6.75	11.88	10.50
April	17.00	10.31	7.50	7.19	11.69	10.00
May	16.39	9.69	6.00	8.90	10.95	10.44
June	16.00	9.10	6.00	9.25	10.50	10.50
July	16.50	8.44	6.00	10.68	10.30	10.55
August	16.50	8.69	6.30	11.95	9.94	11.44
September	16.39	8.50	7.25	11.25	9.63	12.38
October	15.70	8.13	7.25	10.20	9.53	12.10
November	15.00	8.00	7.25	9.75	9.94	12.13
December	14.50	7.75	6.75	10.44	10.75	12.50
Average	16.07	9.18	6.77	9.16	10.71	11.30

	1936	1937	1938	1939	1940	1941
January	$12.62	$17.37	$14.75	$15.25	$18.00	$20.50
February	13.25	18.50	14.75	15.25	17.38	20.00
March	13.75	19.60	14.55	15.38	17.12	20.00
April	13.69	20.00	13.37	15.62	16.75	19.00
May	12.81	18.62	12.13	15.25	17.56	18.75
June	12.00	17.20	12.20	15.41	19.69	18.75
July	12.31	19.00	13.63	15.62	18.95	18.75
August	14.00	19.75	14.35	16.25	19.56	18.75
September	15.40	19.00	14.25	18.87	20.50	18.75
October	15.75	16.38	14.75	22.35	20.70	18.75
November	15.12	13.75	14.75	20.75	20.75	18.75
December	15.50	14.25	15.12	18.92	20.85	18.75
Average	13.85	17.78	14.05	17.08	18.98	19.13

No. 1 Machinery Cast Scrap, at Chicago, Net* Ton

	1929	1931	1932	1933	1934	1935
January	$15.81	$9.50	$7.75	$6.25	$9.50	$10.60
February	16.25	9.50	7.50	6.25	9.50	10.00
March	16.00	9.50	7.20	6.25	9.50	9.38
April	16.00	9.39	7.00	7.06	9.50	9.00
May	15.39	9.00	6.50	8.45	8.90	9.00
June	14.75	9.00	6.13	8.75	7.50	9.00
July	14.50	9.00	6.00	10.63	8.05	9.30
August	14.50	9.00	6.10	10.50	8.00	10.87
September	14.50	8.50	6.25	10.00	8.00	11.19
October	14.50	8.50	6.25	9.88	8.00	11.25
November	13.63	8.50	6.25	8.60	8.25	11.50
December	13.50	8.50	6.25	8.75	9.65	11.80
Average	15.11	8.95	6.60	8.45	8.69	10.24

	1936	1937	1938	1939	1940	1941
January	$12.00	$15.87	$12.50	$12.56	$14.00	$18.88
February	12.75	16.25	12.19	12.75	13.75	19.25
March	13.10	17.40	11.65	12.75	13.56	20.75
April	12.50	17.12	10.88	12.12	14.81	*22.33
May	12.00	15.25	10.75	11.75	16.31	21.40
June	12.00	15.00	10.45	12.15	17.31	21.00
July	12.12	15.75	12.00	12.25	16.75	21.00
August	13.37	16.55	13.35	12.25	16.88	21.00
September	13.60	14.38	13.00	14.50	17.13	21.00
October	14.00	13.18	12.25	16.87	17.75	21.00
November	14.00	11.65	12.60	15.65	18.00	21.00
December	14.75	12.12	12.50	14.50	19.13	21.00
Average	13.02	15.04	12.01	13.34	16.28	20.80

*Changed from gross ton basis April 30, 1941

The Iron Age

No. 1 Machinery Cast, at Cincinnati, Gross Ton

	1929	1931	1932	1933	1934	1935
January	$17.14	$12.60	$10.00	$7.55	$9.50	$10.25
February	17.24	12.60	10.00	6.50	9.50	9.94
March[b]	17.19	12.60	10.00	6.50	10.00	9.19
April	17.19	11.90	10.00	6.50	10.00	8.75
May	17.19	11.25	10.00	6.75	9.45	8.87
June	17.19	11.25	8.50	7.13	9.00	9.06
July	17.19	11.25	8.00	8.75	9.00	9.10
August	17.05	11.25	7.50	9.50	8.88	9.94
September	16.96	9.45	8.00	9.50	8.75	10.00
October	16.92	9.04	8.25	9.50	8.75	10.50
November	16.57	8.93	8.25	9.12	8.88	10.50
December	16.52	8.93	8.25	9.19	9.85	10.90
Average	17.03	10.92	8.90	8.04	9.30	9.75

	1936	1937	1938	1939	1940	1941
January	$11.37	$15.75	$11.25	$13.75	$17.65	$22.75
February	11.75	16.12	10.87	13.75	16.69	22.50
March	12.40	17.30	11.05	14.38	16.25	*22.50
April	12.19	17.37	10.62	13.56	16.05	.....
May	11.50	14.44	10.25	12.00	16.88	.....
June	11.20	14.00	10.10	12.13	19.38	.....
July	11.19	14.87	11.75	12.25	18.65	.....
August	12.43	16.25	12.65	12.80	18.75	.....
September	13.60	14.25	12.31	15.38	20.12	*22.50
October	14.00	13.38	12.31	19.55	20.55	22.50
November	14.00	11.85	13.15	18.88	21.00	22.50
December	15.12	10.75	13.88	17.75	22.50	22.50
Average	12.56	14.69	11.68	14.68	18.71	.....

* In transition from open market quotations to official OPA price maximums, this grade not quoted. However in action in September, the maximum schedules were revised by OPA to include this grade as "No. 1 machinery cast, drop broken, 150 lb. and under."

The Iron Age

Iron and Steel Scrap Exports, Gross Tons

1929	557,044	1933	773,406
1930	358,649	1934	1,835,170
1931	136,125	1935	2,103,959
1932	227,522	1936	1,882,041

	1937	1938	1939	1940	1941
Jan.	68,884	355,781	225,434	187,457*	45,055
Feb.	143,197	255,627	222,704	234,716	74,378
Mar.	355,979	334,742	310,223	206,928	54,383
April	421,383	306,900	237,691	221,152	120,152
May	630,871	371,745	382,642	312,483	62,894
June	514,651	160,577	397,321	318,369	59,018
July	420,097	125,399	347,249	327,129	59,905
Aug.	473,933	106,867	290,346	355,991	80,255
Sept.	252,713	142,625	327,724	255,608	65,486
Oct.	184,547	221,466	334,664	258,926	.....
Nov.	254,072	271,385	271,293	74,349	.....
Dec.	319,016	321,261	204,298	69,980	.....
Year	4,039,143	2,974,375	3,551,589	2,823,088	621,526†

* After this date figures include tin plate, waste tin plate and terneplate scrap and clippings.
† Nine months' total.

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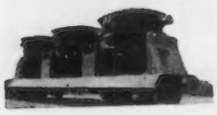

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CLUTCHES AND HYDRAULIC DRIVES
REG. U. S. PAT. OFF.

Ferromanganese (80 Per Cent), Gross Ton, at Seaboard

	1929	1931	1932	1933	1934	1935
January	$105.00	$80.00	$75.00	$68.00	$85.00	$85.00
February	105.00	80.00	75.00	68.00	85.00	85.00
March	105.00	80.00	75.00	68.00	85.00	85.00
April	105.00	80.00	75.00	68.00	85.00	85.00
May	105.00	80.00	75.00	68.00	85.00	85.00
June	105.00	80.00	68.00	68.00	85.00	85.00
July	105.00	80.00	68.00	82.00	85.00	85.00
August	105.00	80.00	68.00	82.00	85.00	85.00
September	105.00	80.00	68.00	82.00	85.00	85.00
October	105.00	80.00	68.00	82.00	85.00	85.00
November	105.00	80.00	68.00	82.00	85.00	85.00
December	105.00	73.60	68.00	82.00	85.00	85.00
Average	105.00	79.47	70.92	75.00	85.00	85.00

	1936	1937	1938	1939	1940	1941
January	$75.00	$80.00	$102.50	$85.00	$100.00	$120.00
February	75.00	80.00	102.50	80.00	100.00	120.00
March	75.00	89.00	102.50	80.00	100.00	120.00
April	75.00	95.00	102.50	80.00	100.00	120.00
May	75.00	100.62	102.50	80.00	100.00	120.00
June	75.00	102.50	102.50	80.00	110.00	120.00
July	75.00	102.50	92.50	80.00	120.00	120.00
August	75.00	102.50	92.50	80.00	120.00	120.00
September	75.00	102.50	92.50	95.00	120.00	120.00
October	75.00	102.50	92.50	100.00	120.00	120.00
November	80.00	102.50	92.50	100.00	120.00	120.00
December	80.00	102.50	92.50	100.00	120.00	120.00
Average	75.83	96.84	97.50	86.67	110.84	120.00

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"THE HOUSE OF MAGNETIC MAGIC"

STEARNS MAGNETIC MANUFACTURING CO.
635 S. 28th St. Milwaukee, Wis.

Spiegeleisen (19 to 21 Per Cent), Gross Ton, at Furnace

	1929	1931	1932	1933	1934	1935
January	$31.00	$28.00	$26.00	$24.00	$27.00	$26.00
February	31.00	28.00	26.00	24.00	27.00	26.00
March	31.00	28.00	26.00	24.00	26.50	26.00
April	31.00	28.00	26.00	24.00	26.00	26.00
May	31.00	28.00	26.00	24.00	26.00	26.00
June	31.00	28.00	25.75	24.00	25.00	26.00
July	31.00	28.00	25.00	27.00	26.00	26.00
August	31.00	28.00	25.00	27.00	26.00	26.00
September	31.00	28.00	25.00	27.00	26.00	26.00
October	31.00	28.00	25.00	27.00	26.00	26.00
November	31.00	28.00	24.40	27.00	26.00	26.00
December	31.00	26.20	24.00	27.00	26.00	26.00
Average	31.00	27.85	25.35	25.50	26.21	26.00

	1936	1937	1938	1939	1940	1941
January	$26.00	$26.00	$33.00	$28.00	$32.00	$36.00
February	26.00	26.00	33.00	28.00	32.00	36.00
March	26.00	28.40	33.00	28.00	32.00	36.00
April	26.00	30.00	33.00	28.00	32.00	36.00
May	26.00	32.25	33.00	28.00	32. 0	36.00
June	26.00	33.00	33.00	28.00	34.40	36.00
July	26.00	33.00	28.00	28.00	36.00	36.00
August	26.00	33.00	28.00	28.00	36.00	36.00
September	26.00	33.00	28.00	31.00	36.00	36.00
October	26.00	33.00	28.00	32.00	36.00	36.00
November	26.00	33.00	28.00	32.00	36.00	36.00
December	26.00	33.00	28.00	32.00	36.00	36.00
Average	26.00	31.14	30.50	29.25	34.20	36.00

The Iron Age

50 Per Cent Ferrosilicon, Carloads, Gross Ton, Delivered East of Mississippi River

	1929	1931	1932	1933	1934	1935
January	$83.50	$83.50	$77.50	$74.50	$77.50	$77.50
February	83.50	83.50	77.50	74.50	77.50	77.50
March	83.50	83.50	77.50	74.50	77.50	77.50
April	83.50	83.50	77.50	74.50	77.50	77.50
May	83.50	83.50	77.50	74.50	77.50	77.50
June	83.50	83.50	77.50	74.50	77.50	77.50
July	83.50	83.50	77.50	74.50	77.50	77.50
August	83.50	83.50	77.50	74.50	77.50	77.50
September	83.50	83.50	77.50	74.50	77.50	77.50
October	83.50	83.50	77.50	74.50	77.50	77.50
November	83.50	83.50	77.50	74.50	77.50	77.50
December	83.50	83.50	77.50	74.50	77.50	77.50
Average	83.50	83.50	77.50	74.50	77.50	77.50

	1936	1937	1938	1939	1940	1941
January	$77.50	$69.50	$69.50	$69.50	$69.50	$74.50
February	77.50	69.50	69.50	69.50	69.50	74.50
March	77.50	69.50	69.50	69.50	69.50	74.50
April	77.50	69.50	69.50	69.50	69.50	74.50
May	77.50	69.50	69.50	69.50	69.50	74.50
June	77.50	69.50	69.50	69.50	72.00	74.50
July	69.50	69.50	69.50	69.50	74.50	74.50
August	69. 0	69.50	69.50	69.50	74.50	74.50
September	69.50	69.50	69.50	69.50	74.50	74.50
October	69.50	69.50	69.50	69.50	74.50	74.50
November	69.50	69.50	69.50	69.50	74.50	74.50
December	69.50	69.50	69.50	69.50	74.50	74.50
Average	73.50	69.50	69.50	69.50	72.11	74.50

The Iron Age

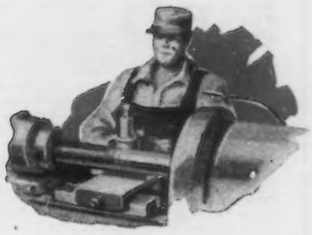
Cast Iron Pipe at New York, Net Ton

6-in. and Larger

	1929	1931	1932	1933	1934	1935
January	$39.60	$37.90	$30.20	$35.20	$43.00	$45.00
February	39.35	37.90	29.70	35.30	43.00	45.00
March	38.60	37.90	28.40	35.30	43.00	45.00
April	37.40	35.40	28.20	35.30	43.00	45.00
May	35.85	34.15	28.20	35.30	43.00	45.00
June	35.10	33.70	28.20	38.30	44.00	45.15
July	33.20	32.90	28.73	38.30	45.00	45.20
August	33.60	32.90	31.10	38.30	45.00	45.20
September	33.60	32.90	31.30	38.30	45.00	45.20
October	34.60	32.90	33.30	38.00	45.00	45.20
November	34.60	32.90	33.30	43.00	45.00	45.20
December	34.60	32.50	34.30	43.00	45.00	45.20
Average	35.84	34.50	30.41	37.81	44.08	45.11

	1936	1937	1938	1939	1940	1941
January	$45.20	$48.00	$53.00	$49.00	$52.20	$52.20
February	45.20	48.00	53.00	49.00	52.20	52.20
March	45.20	51.00	53.00	49.00	52.20	52.20
April	45.20	53.00	53.00	49.00	52.20	52.20
May	45.20	53.00	53.00	49.00	52.20	52.20
June	45.20	53.00	52.20	49.00	52.20	52.20
July	45.90	53.00	49.00	49.00	52.20	52.20
August	45.90	53.00	49.00	49.00	52.20	52.20
September	45.90	53.00	49.00	49.00	52.20	52.20
October	45.90	53.00	49.00	52.20	52.20	52.20
November	45.90	53.00	49.00	52.20	52.20	52.20
December	47.90	53.00	49.00	52.20	52.20	52.20
Average	45.71	52.00	50.93	49.80	52.20	52.20

LATROBE



The Mark of Better Tool Steels

▲ A trade-mark should be more than a mere mark of identity . . . it should provide a tangible expression of merit!

For years this distinctive *Latrobe* symbol has served to identify the finest in tool steel quality. ▲ Today, when tooling demands are so critical, the utmost in tool steel value must be assured. ▲ You can depend upon the *Latrobe* trademark, for it has become recognized throughout Industry as *The Mark of Better Tool Steels!*

Latrobe

ELECTRIC STEEL COMPANY

MAIN OFFICES & PLANT · LATROBE · PA.

BRANCH OFFICES AND WAREHOUSES:

DETROIT	LOS ANGELES	NEW YORK	ROCHESTER
TOLEDO	PHILADELPHIA	CINCINNATI	INDIANAPOLIS
DAYTON	CHICAGO	MILWAUKEE	WASHINGTON
PITTSBURGH	CLEVELAND	HARTFORD	SEATTLE

FREE FLOW of parts-in-process

You can save valuable hours spent looking for parts in stockroom boxes that must be plied and unpiled. You can end the time-waste transferring parts from bins to tote pans and back to bins again. You can erect easily movable storage units in odd corners, under benches, near machines. You can put every part needed for an assembly operation within easy reach and vision of an individual worker . . . any of these are easy and quick with units of the inexpensive Stackbin System.

Typical users of the Stackbin System are America's aircraft plants, quick to adopt a new, proved method of speeding production. Other users include the largest and most efficient plants in many other industries. Write—today—for the brochure "Lower Cost Storage and Handling."

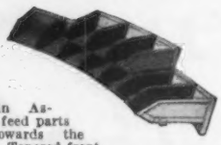
STACKBIN CORP.
89 Troy St., Providence, R. I.

IDEAL STOCKROOM UNIT
is this combination of Stackbins - in - Stackracks. Parts and materials are transferred from one department to another, are used or processed and passed along in their storage container. No waste time—less loss and damage.

STACKRACKS
are individual racks of heavy steel—made in any size you need. Locking together without tools, they make a strong, rigid storage rack of any capacity, height or shape you want.

STACKBINS
are individual hopper - fronted storage bins—with perfectly smooth interiors — which nest to form work units and slide in Stackracks like drawers for storage.

AS FLEXIBLE, EASY TO ASSEMBLE
as sectional bookcases, nested Stackbin sections provide temporary storage space wherever needed. Many modern plants use them as room or departmental storage "depots."



SLOPING FLOORS
permit Stackbin Assembly Bins to feed parts continuously towards the front of the bin. Tapered front design provides semi-circular set-up, so that all parts are within easy reach.

All products in the Stackbin System are of heavy steel, welded for permanent rigidity.

STACKBIN
STACKED AND STILL ACCESSIBLE
SYSTEM

Steel Ingot

Open Hearth, Bessemer and Electric Ingots

For Data Previous to 1917, See Statistical

Source: American Iron

	1917	1918	1919	1920	1921	1922	1923	1924
January		2,998,947	4,120,565	3,974,213	2,832,150	2,129,686	4,325,457	4,107,080
February		3,094,059	3,586,108	3,836,328	2,248,923	2,332,217	3,909,643	4,305,501
March	21,117,309	4,232,541	3,529,865	4,417,344	2,019,465	3,168,503	4,579,489	4,733,607
April		4,304,701	2,969,604	3,532,623	1,560,522	3,267,086	4,463,564	3,767,877
May		4,473,198	2,557,668	3,860,482	1,627,229	3,623,434	4,748,038	2,970,710
June	4,117,389	4,195,869	2,942,435	3,991,068	1,289,861	3,520,973	4,242,308	2,324,411
July	3,924,045	4,236,970	3,325,559	3,752,903	1,032,726	3,324,009	3,976,776	2,112,991
August	4,169,843	4,196,207	3,640,994	4,017,502	1,462,971	2,959,784	4,161,827	2,872,652
September	3,968,295	4,351,304		4,016,322	1,510,108	3,172,549	3,780,066	3,181,798
October	4,475,206	4,561,598	11,357,194	4,038,323	2,078,382	3,838,975	4,028,163	3,516,891
November	4,227,306	4,165,018		3,533,112	2,133,903	3,861,539	3,529,560	3,512,087
December	3,649,822	4,071,867		3,133,690	1,834,504	3,715,317	3,224,324	4,016,316
Total	49,649,215	48,882,299	38,029,992	46,103,910	21,630,744	38,914,072	48,969,215	41,421,921

	1930	1931	1932	1933	1934	1935	1936
January	4,288,212	2,852,540	1,685,665	1,157,745	2,276,596	3,279,411	3,474,353
February	4,579,761	2,892,154	1,681,421	1,221,664	2,521,472	3,169,849	3,379,587
March	4,828,571	3,468,208	1,627,030	1,022,675	3,190,040	3,273,848	3,810,436
April	4,664,182	3,141,887	1,429,848	1,531,813	3,346,922	3,017,120	4,494,782
May	4,520,520	2,897,385	1,277,302	2,250,236	3,875,202	3,009,189	4,614,529
June	3,879,960	2,416,078	1,036,102	2,919,687	3,487,612	2,580,723	4,543,888
July	3,316,654	2,143,351	915,738	3,607,288	1,697,879	2,591,191	4,473,940
August	3,473,898	1,949,462	961,153	3,260,279	1,574,649	3,331,707	4,782,442
September	3,223,766	1,754,817	1,125,892	2,599,370	1,446,551	3,227,815	4,744,841
October	3,055,972	1,805,653	1,233,957	2,373,729	1,689,272	3,590,878	5,182,430
November	2,510,820	1,807,315	1,171,710	1,731,930	1,336,008	3,599,619	4,941,014
December	2,246,742	1,477,529	977,389	2,047,780	2,239,126	3,511,636	5,056,843
Total	44,589,058	28,606,379	15,123,207	25,724,196	29,181,329	38,182,986	53,499,085

* Eleven months total.

Output of Stainless and Heat Resisting Ingots and Castings

Reported by Analysis Groups* in Net Tons. Source: THE IRON AGE

Ingots:	1929	1930	1931	1932	1933	1934
18 Cr and 8 per cent Ni	21,074	32,867	14,740	9,209	19,620	24,818
16 Cr and 2 per cent Ni	.....	.....	.....	.....	.....	.....
25 Cr and 12 per cent Ni	.....	.....	.....	.....	.....	.....
12 to 14 per cent Cr	14,552	8,821	5,397	4,900	7,401	9,470
16 to 18 per cent Cr	10,127	7,995	7,483	6,751	4,969	8,787
18 to 30 per cent Cr	.....	.....	.....	.....	.....	.....
All others (Cr and Cr-Ni)**	2,950	4,792	3,438	3,312	5,262	8,832
Not allocated	187	474	622	660	.....	.....
Total	48,890	54,949	31,680	24,832	37,252	51,907
Castings, all grades, total	5,202	4,321	3,221	2,186	2,793	3,874
GRAND TOTAL (ingots and castings)	54,092	59,270	34,901	27,018	40,045	55,781

Ingots:	1935	1936	1937	1938	1939‡	1940‡
18 Cr and 8 per cent Ni	30,114	45,800	55,011	43,129	76,332	118,663
16 Cr and 2 per cent Ni	.....	.....	.....	.....	.....	2,370
25 Cr and 12 per cent Ni	3,827	5,530	6,423	(?)	7,342	10,495
12 to 14 per cent Cr	15,220	25,430	30,186	13,429	15,135	20,375
16 to 18 per cent Cr	14,101	21,478	28,500	16,454	35,506	55,476
18 to 30 per cent Cr	1,606	1,022	1,615	(?)	937	1,713
All others (Cr and Cr-Ni)**	6,713	2,900	5,107	22,942	38,084	55,783
Not allocated	.....	.....	.....	.....	.....	.....
Total	71,581	102,160	126,842	95,954†	173,336	264,875
Castings, all grades, total	4,071	5,901	7,999	4,030	9,646	11,823
GRAND TOTAL (ingots and castings)	75,652	108,061	134,841	99,984	178,290	276,698

* Analyses groups are approximate; in several classifications each element may vary as much as ±2 per cent from the range shown, or may contain other elements such as molybdenum. In the case of *castings* a sizable percentage of the tonnage in any of the straight-chromium classifications may contain from 0 to several per cent nickel.

† American Iron and Steel Institute figure. Does not include low-alloy valve steels covered in various IRON AGE surveys.

‡ Converted from consumption survey as explained in text; 1939 and 1940 figures adjusted to include exports.

** This "catch-all" contains many analyses groups: In *finished steel* there are included such analyses as 4 to 6% Cr, 25 Cr-20 Ni, 5 to 8% Cr, 15 Cr-35 Ni, etc; for *castings*, by far the three most prominent are the important heat-resisting analysis 33-36, Ni and 15-17 Cr; the popular analyses in the range 60 + Ni and 10-17 Cr; and the slightly less important analysis group 36-40 Ni and 18-20 Cr. In 1940 the 35 Ni-15 Cr and 60 Ni-12 Cr groups accounted for 1700 tons and 890 tons respectively.

Production

and Steel for Castings—Net Tons

Supplement, THE IRON AGE, Jan. 4, 1940

and Steel Institute

1925	1926	1927	1928	1929
4,719,919	4,656,029	4,302,172	4,531,172	5,115,195
4,223,613	4,264,863	4,327,341	4,590,842	4,920,348
4,721,111	5,035,081	5,148,330	5,117,384	5,760,878
4,033,752	4,626,271	4,685,249	4,888,226	5,626,610
3,888,883	4,425,910	4,594,340	4,776,736	6,008,754
3,606,900	4,207,512	3,968,129	4,250,736	5,573,076
3,471,854	4,095,783	3,637,255	4,320,783	5,513,546
3,850,644	4,492,374	3,971,467	4,744,291	5,614,144
3,927,822	4,409,463	3,710,754	4,709,416	5,146,744
4,377,214	4,591,053	3,764,573	5,279,460	5,154,063
4,393,068	4,175,502	3,549,711	4,844,460	4,002,365
4,469,629	3,906,230	3,604,731	4,562,175	3,299,786
49,684,409	52,886,071	49,264,052	56,615,711	61,735,50

1937	1938	1939	1940	1941
5,398,326	1,984,815	3,863,004	5,764,723	6,928,085
5,050,824	1,942,795	3,448,120	4,525,797	6,237,900
5,970,247	2,293,884	3,929,387	4,389,183	7,131,641
5,801,540	2,196,413	3,431,600	4,100,474	6,756,949
5,894,260	2,061,169	3,372,636	4,967,782	7,053,238
4,787,710	1,868,848	3,606,729	5,657,443	6,800,730
5,212,832	2,259,677	3,648,639	5,724,625	6,821,682
5,580,683	2,903,805	4,341,726	6,186,383	7,000,957
4,907,592	3,029,736	4,881,601	6,056,246	6,819,706
3,881,819	3,554,912	6,223,126	6,644,542	7,242,683
2,464,793	4,072,676	6,292,322	6,469,107	6,969,987
1,685,273	3,583,253	5,958,893	6,495,357	.....
56,635,899	31,751,983	52,797,783	66,981,662	75,763,558*

Steel Ingot Production

Per Cent of Capacity

Source: American Iron and Steel Institute

	1923	1924	1925	1926	1927	1928
January	$77.08	$72.48	$80.73	$87.09	$77.94	$80.33
February	77.17	81.30	80.00	88.35	86.82	87.09
March	81.62	83.54	80.75	94.18	93.27	90.73
April	82.16	68.65	71.25	89.36	87.65	89.49
May	84.61	52.42	66.52	82.79	83.23	84.69
June	78.07	42.36	63.72	81.27	74.24	77.82
July	71.03	37.37	59.50	76.78	66.04	76.78
August	74.17	50.69	65.86	84.03	71.95	84.11
September	69.73	66.07	69.54	85.37	69.58	86.42
October	71.78	62.05	74.87	85.88	68.20	93.60
November	64.95	63.99	77.59	80.65	66.41	88.69
December	57.59	71.02	76.62	73.23	65.45	81.07
Average	74.15	61.94	72.20	84.05	75.83	85.05

	1929	1931	1932	1933	1934	1935
January	86.56	44.59	25.88	17.76	34.32	49.21
February	92.21	50.07	27.62	20.75	42.10	52.68
March	97.48	54.21	24.98	15.68	48.09	49.12
April	98.32	50.71	22.67	24.26	52.10	46.75
May	101.68	45.29	19.61	34.51	58.42	45.15
June	97.38	39.00	16.42	46.24	54.29	39.99
July	93.51	33.58	14.09	55.45	25.65	38.97
August	95.00	30.47	14.76	50.00	23.74	49.99
September	90.14	28.39	17.89	41.26	22.57	50.13
October	87.22	28.22	18.94	36.40	25.46	53.88
November	69.94	29.17	18.57	27.43	28.58	55.77
December	55.96	23.15	15.04	31.48	33.83	52.81
Average	88.76	37.99	19.67	33.52	37.37	48.68

	1936	1937	1938	1939	1940	1941
January	52.46	81.32	29.14	52.69	83.40	96.90
February	54.61	84.26	31.59	54.93	70.00	96.60
March	57.54	89.93	33.67	56.52	63.50	99.70
April	70.09	90.24	33.70	50.97	61.20	97.60
May	69.68	88.79	30.26	48.51	71.80	98.70
June	70.85	74.47	28.33	53.57	84.50	98.20
July	67.71	78.37	33.25	52.60	83.00	93.40
August	72.22	83.71	42.63	62.45	89.50	95.70
September	74.16	76.19	46.03	72.68	90.60	96.40
October	78.26	58.23	52.19	89.52	96.10	99.00
November	77.05	38.18	61.74	93.46	96.60	98.30
December	76.53	25.34	52.72	85.91	94.10	.....
Average	68.45	72.33	39.60	64.53	82.10	*97.30

* Eleven months average.

Improve Your Safety Record *with good chain carefully maintained*

One of our customers has followed this straight road to better safety records:

The company has standardized on AMERICAN CHAIN.

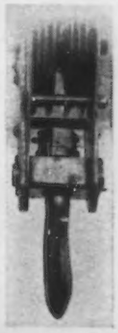
The capacity of each chain is indicated by the color of the hook or pear. Green for 25-ton chain, yellow for 20-ton, red for 2-ton—and others.

Colors and corresponding capacities are painted on the leg of the chain rack.

Check-ups are frequent, repairs prompt.

These and similar precautions will increase the service life of sling chain. We'll back this vitally important program with the best chain we've ever built.

This way of handling chain also saves time in putting chains away and locating them for the next job. Stored this way chains are easy to inspect and maintain.



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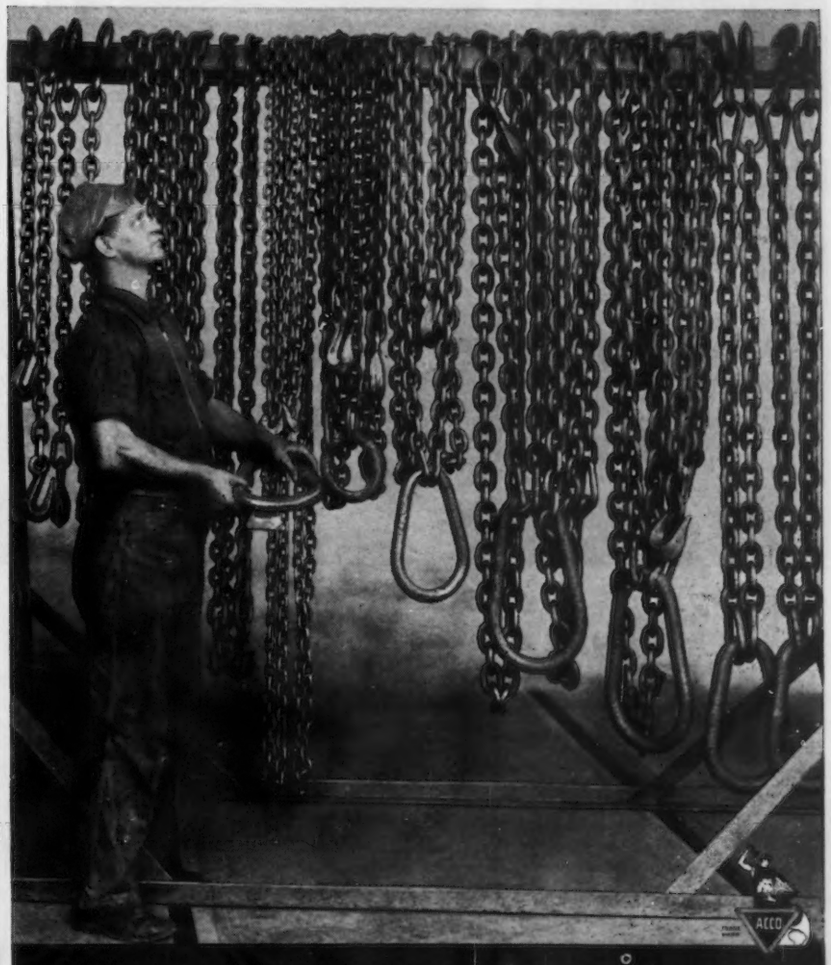

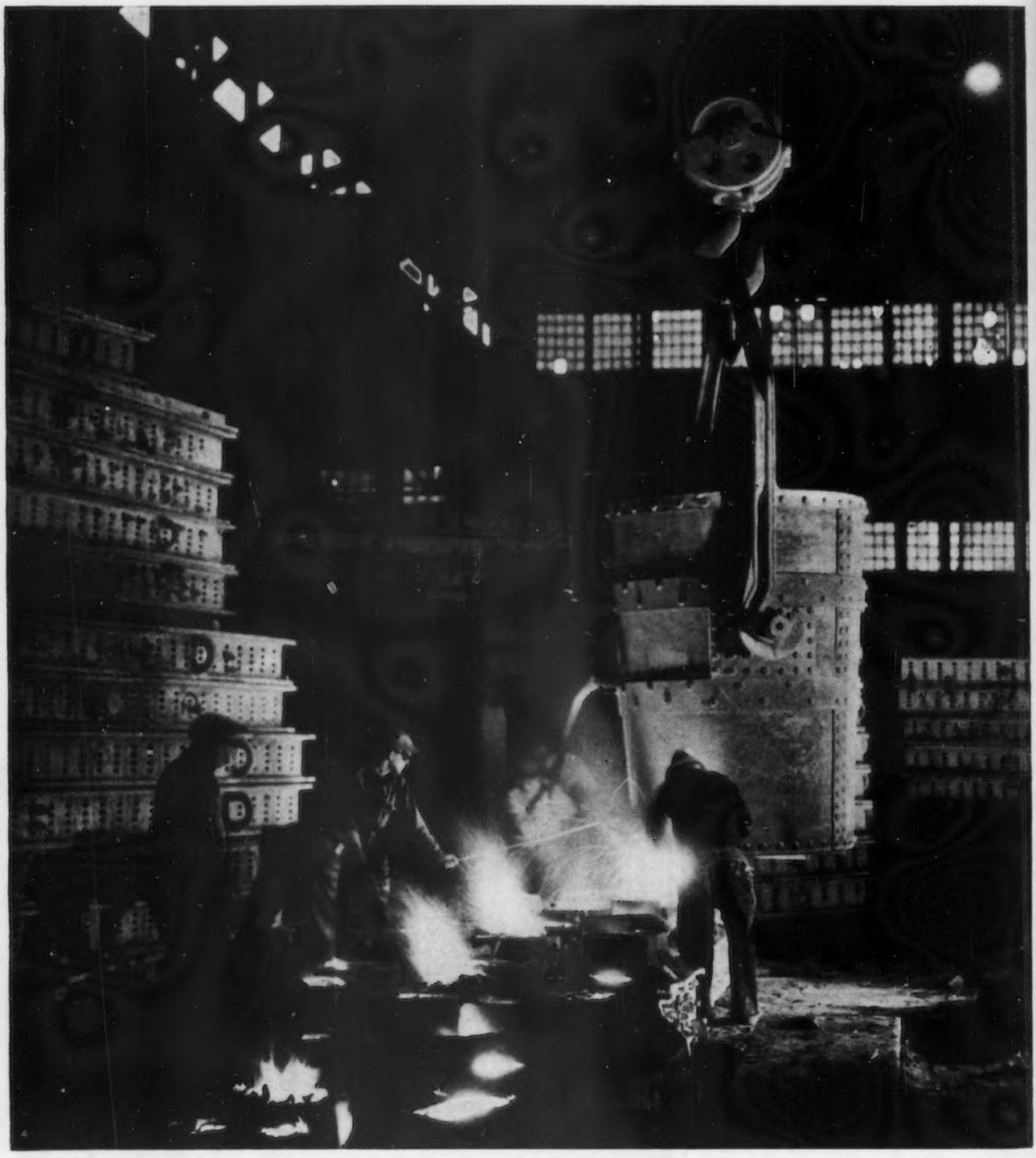

Casting Steel... THE STRONG WAY!

The flash of the camera's eye brings you into the Strong plant at that dramatic moment when a succession of molds are being poured in the Strong manner. Such a picture obviously could not be "staged" even in these days of photographic wizardry. Consequently it is our thought that by mailing you from time to time similar pictures of Strong operations you will gain a clearer appreciation of the better steel casting that takes place any working day in the exceptionally equipped plant of the Strong Steel Foundry Company.

Whenever you have occasion to think of steel castings, remember that STRONG castings are all that their name implies . . . in precision, tensile strength, ductility, elongation, heat treatment, laboratory control, adherence to specifications, cleanliness and machinability. As this first folder of a forthcoming series comes into your hands, we would also like to add our "strongest" wishes for a year of continued progress for, no matter what happens in the year ahead, may we all hold fast to that faith in America's productive genius which we know will ultimately return this world to a life of sanity, peace and plenty.

STRONG STEEL FOUNDRY COMPANY · BUFFALO · N · Y ·

Finished Steel Composite Price

(Cents per lb.)

Source: THE IRON AGE

• • • **Weighted average of** THE IRON AGE quotations on following steel items: hot rolled and cold rolled strip, bars, plates, shapes, hot rolled and cold rolled sheets, wire rails and pipe. The composite was revised in 1941 to obtain greater sensitivity in reflecting price changes. This revision was described in detail in issue of Aug. 28, 1941, p. 92. Averages on the old basis for previous years were published in the Annual Statistical Supplement, Jan. 4, 1940.

	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941
January	2.27758	2.22883	1.99051	1.851549	1.83017	1.95757	2.06492	2.07642	2.32263	2.58414	2.35367	2.30467	2.30467
February	2.27758	2.21248	1.99629	1.842512	1.81151	1.95757	2.06492	2.06513	2.32263	2.58084	2.35367	2.30467	2.30467
March	2.27623	2.20814	1.99185	1.852212	1.80821	1.95757	2.06492	2.05463	2.53185	2.57754	2.35367	2.30467	2.30467
April	2.30373	2.40044	1.97381	1.891812	1.77951	2.00659	2.06492	2.06220	2.58414	2.57754	2.35367	2.26651	2.30467
May	2.30723	2.11811	1.96774	1.890912	1.76994	2.15367	2.06492	2.06220	2.58414	2.56939	2.30807	2.30467	2.30467
June	2.31773	2.09279	1.960912	1.888112	1.78578	2.15367	2.06492	2.06680	2.58414	2.51300	2.28297	2.30467	2.30467
July	2.31213	2.05579	1.939937	1.891962	1.84089	2.10667	2.06492	2.13890	2.58414	2.35944	2.28297	2.30467	2.30467
August	2.29423	2.03101	1.943212	1.889002	1.85084	2.06492	2.06492	2.13890	2.58414	2.35944	2.28297	2.30467	2.30467
September	2.28225	2.01087	1.943212	1.88308	1.87877	2.06492	2.06492	2.14554	2.58414	2.35655	2.28297	2.30467	2.30467
October	2.26950	2.00104	1.941574	1.87324	1.95473	2.06492	2.07642	2.17210	2.58414	2.31964	2.28297	2.30467	2.30467
November	2.26498	1.99291	1.936662	1.86553	1.94737	2.06492	2.07642	2.17210	2.58414	2.35367	2.28837	2.30467	2.30467
December	2.27750	1.98523	1.902362	1.86053	1.95757	2.06492	2.07642	2.26276	2.58414	2.35367	2.30467	2.30467	2.30467
Average	2.28839	2.11064	1.95734	1.87337	1.85127	2.05149	2.06779	2.11814	2.53620	2.45874	2.31088	2.27287	2.30467

The Iron Age

Plates at Pittsburgh, Cents a Pound

	1929	1931	1932	1933	1934	1935
January	1.90	1.64	1.50	1.60	1.70	1.80
February	1.90	1.65	1.50	1.60	1.70	1.80
March	1.90	1.65	1.52	1.60	1.70	1.80
April	1.95	1.65	1.60	1.55	1.74	1.80
May	1.95	1.65	1.60	1.50	1.85	1.80
June	1.95	1.65	1.60	1.53	1.85	1.80
July	1.95	1.63	1.60	1.60	1.81	1.80
August	1.95	1.60	1.60	1.60	1.80	1.80
September	1.95	1.60	1.60	1.60	1.80	1.80
October	1.94	1.60	1.60	1.70	1.80	1.80
November	1.90	1.60	1.60	1.70	1.80	1.80
December	1.90	1.54	1.60	1.70	1.80	1.80
Average	1.93	1.62	1.57	1.61	1.78	1.80

	1936	1937	1938	1939	1940	1941
January	1.80	2.05	2.25	2.10	2.10	2.10
February	1.80	2.05	2.25	2.10	2.10	2.10
March	1.80	2.21	2.25	2.10	2.10	2.10
April	1.80	2.25	2.25	2.10	2.10	2.10
May	1.80	2.25	2.25	2.10	2.10	2.10
June	1.80	2.25	2.22	2.10	2.10	2.10
July	1.90	2.25	2.10	2.10	2.10	2.10
August	1.90	2.25	2.10	2.10	2.10	2.10
September	1.90	2.25	2.10	2.10	2.10	2.10
October	1.90	2.25	2.10	2.10	2.10	2.10
November	1.90	2.25	2.10	2.10	2.10	2.10
December	1.90	2.25	2.10	2.10	2.10	2.10
Average	1.85	2.21	2.17	2.10	2.10	2.10

The Iron Age

Hot-Rolled Sheets at Pittsburgh, Cents a Pound

	1929	1931	1932	1933	1934	1935
January	2.10	1.90	1.75	1.62	1.75	1.85
February	2.10	1.90	1.75	1.60	1.75	1.85
March	2.10	1.90	1.71	1.55	1.75	1.85
April	2.10	1.85	1.70	1.55	1.81	1.85
May	2.13	1.85	1.70	1.44	2.00	1.85
June	2.20	1.85	1.70	1.50	2.00	1.85
July	2.14	1.85	1.70	1.65	1.88	1.85
August	2.10	1.85	1.70	1.65	1.85	1.85
September	2.10	1.85	1.70	1.68	1.85	1.85
October	2.10	1.85	1.70	1.75	1.85	1.85
November	2.10	1.85	1.70	1.75	1.85	1.85
December	2.18	1.80	1.70	1.75	1.85	1.85
Average	2.12	1.86	1.71	1.62	1.85	1.85

	1936	1937	1938	1939	1940	1941
January	1.85	2.15	2.40	2.15	2.10	2.10
February	1.85	2.15	2.40	2.15	2.10	2.10
March	1.85	2.35	2.40	2.15	2.10	2.10
April	1.85	2.40	2.40	2.15	2.10	2.10
May	1.85	2.40	2.38	2.06	1.98	2.10
June	1.87	2.40	2.27	2.00	2.10	2.10
July	1.95	2.40	2.15	2.00	2.10	2.10
August	1.95	2.40	2.15	2.00	2.10	2.10
September	1.95	2.40	2.15	2.00	2.10	2.10
October	1.95	2.40	2.03	2.00	2.10	2.10
November	1.95	2.40	2.15	2.02	2.10	2.10
December	2.15	2.40	2.15	2.10	2.10	2.10
Average	1.92	2.35	2.25	2.06	2.09	2.10

NOTICE

For production furnaces—either electric or fuel fired—for *any* heat treating process—for handling *any* product or for *any* production, consult The Electric Furnace Co., Salem, Ohio . . . Our large and experienced engineering staff and ample manufacturing facilities enable us to make reasonably prompt deliveries.

THE ELECTRIC FURNACE CO.
SALEM, OHIO
U. S. A.

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Casting Steel... THE STRONG WAY!

The flash of the camera's eye brings you into the Strong plant at that dramatic moment when a succession of molds are being poured in the Strong manner. Such a picture obviously could not be "staged" even in these days of photographic wizardry. Consequently it is our thought that by mailing you from time to time similar pictures of Strong operations you will gain a clearer appreciation of the better steel casting that takes place any working day in the exceptionally equipped plant of the Strong Steel Foundry Company.

Whenever you have occasion to think of steel castings, remember that STRONG castings are all that their name implies . . . in precision, tensile strength, ductility, elongation, heat treatment, laboratory control, adherence to specifications, cleanliness and machinability. As this first folder of a forthcoming series comes into your hands, we would also like to add our "strongest" wishes for a year of continued progress for, no matter what happens in the year ahead, may we all hold fast to that faith in America's productive genius which we know will ultimately return this world to a life of sanity, peace and plenty.

STRONG STEEL FOUNDRY COMPANY · BUFFALO · N · Y ·

Finished Steel Composite Price

(Cents per lb.)

Source: THE IRON AGE

• • • **Weighted average of** THE IRON AGE quotations on following steel items: hot rolled and cold rolled strip, bars, plates, shapes, hot rolled and cold rolled sheets, wire rails and pipe. The composite was revised in 1941 to obtain greater sensitivity in reflecting price changes. This revision was described in detail in issue of Aug. 28, 1941, p. 92. Averages on the old basis for previous years were published in the Annual Statistical Supplement, Jan. 4, 1940.

	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941
January	2.27758	2.22883	1.99051	1.851549	1.83017	1.95757	2.06492	2.07642	2.32263	2.58414	2.35367	2.30467	2.30467
February	2.27758	2.21248	1.99629	1.842512	1.81151	1.95757	2.06492	2.06513	2.32263	2.58084	2.35367	2.30467	2.30467
March	2.27623	2.20814	1.99185	1.852212	1.80821	1.95757	2.06492	2.05463	2.53185	2.57754	2.35367	2.30467	2.30467
April	2.30373	2.40044	1.97381	1.891812	1.77951	2.00659	2.06492	2.06220	2.58414	2.57754	2.35367	2.26651	2.30467
May	2.30723	2.11811	1.96774	1.890912	1.76994	2.15367	2.06492	2.06220	2.58414	2.56939	2.30807	2.30467	2.30467
June	2.31773	2.09279	1.960912	1.888112	1.78578	2.15367	2.06492	2.06680	2.58414	2.51300	2.28297	2.30467	2.30467
July	2.31213	2.05579	1.939937	1.891962	1.84089	2.10667	2.06492	2.13890	2.58414	2.35944	2.28297	2.30467	2.30467
August	2.29423	2.03101	1.943212	1.889002	1.85084	2.06492	2.06492	2.13890	2.58414	2.35944	2.28297	2.30467	2.30467
September	2.28225	2.01087	1.943212	1.88308	1.87877	2.06492	2.06492	2.14554	2.58414	2.35655	2.28297	2.30467	2.30467
October	2.26950	2.00104	1.941574	1.87324	1.95473	2.06492	2.07642	2.17210	2.58414	2.31964	2.28297	2.30467	2.30467
November	2.26498	1.99291	1.936662	1.86553	1.94737	2.06492	2.07642	2.17210	2.58414	2.35367	2.28837	2.30467	2.30467
December	2.27750	1.97523	1.902362	1.86053	1.95757	2.06492	2.07642	2.26276	2.58414	2.35367	2.30467	2.30467	2.30467
Average	2.28839	2.11064	1.95734	1.87337	1.85127	2.05149	2.06779	2.11814	2.53620	2.45874	2.31088	2.27287	2.30467

The Iron Age

Plates at Pittsburgh, Cents a Pound

	1929	1931	1932	1933	1934	1935
January	1.90	1.64	1.50	1.60	1.70	1.80
February	1.90	1.65	1.50	1.60	1.70	1.80
March	1.90	1.65	1.52	1.60	1.70	1.80
April	1.95	1.65	1.60	1.55	1.74	1.80
May	1.95	1.65	1.60	1.50	1.85	1.80
June	1.95	1.65	1.60	1.53	1.85	1.80
July	1.95	1.63	1.60	1.60	1.81	1.80
August	1.95	1.60	1.60	1.60	1.80	1.80
September	1.95	1.60	1.60	1.60	1.80	1.80
October	1.94	1.60	1.60	1.70	1.80	1.80
November	1.90	1.60	1.60	1.70	1.80	1.80
December	1.90	1.54	1.60	1.70	1.80	1.80
Average	1.93	1.62	1.57	1.61	1.78	1.80

	1936	1937	1938	1939	1940	1941
January	1.80	2.05	2.25	2.10	2.10	2.10
February	1.80	2.05	2.25	2.10	2.10	2.10
March	1.80	2.21	2.25	2.10	2.10	2.10
April	1.80	2.25	2.25	2.10	2.10	2.10
May	1.80	2.25	2.25	2.10	2.10	2.10
June	1.80	2.25	2.22	2.10	2.10	2.10
July	1.90	2.25	2.10	2.10	2.10	2.10
August	1.90	2.25	2.10	2.10	2.10	2.10
September	1.90	2.25	2.10	2.10	2.10	2.10
October	1.90	2.25	2.10	2.10	2.10	2.10
November	1.90	2.25	2.10	2.10	2.10	2.10
December	1.90	2.25	2.10	2.10	2.10	2.10
Average	1.85	2.21	2.17	2.10	2.10	2.10

The Iron Age

Hot-Rolled Sheets at Pittsburgh, Cents a Pound

	1929	1931	1932	1933	1934	1935
January	2.10	1.90	1.75	1.62	1.75	1.85
February	2.10	1.90	1.75	1.60	1.75	1.85
March	2.10	1.90	1.71	1.55	1.75	1.85
April	2.10	1.85	1.70	1.55	1.81	1.85
May	2.13	1.85	1.70	1.44	2.00	1.85
June	2.20	1.85	1.70	1.50	2.00	1.85
July	2.14	1.85	1.70	1.65	1.88	1.85
August	2.10	1.85	1.70	1.65	1.85	1.85
September	2.10	1.85	1.70	1.68	1.85	1.85
October	2.10	1.85	1.70	1.75	1.85	1.85
November	2.10	1.85	1.70	1.75	1.85	1.85
December	2.18	1.80	1.70	1.75	1.85	1.85
Average	2.12	1.86	1.71	1.62	1.85	1.85

	1936	1937	1938	1939	1940	1941
January	1.85	2.15	2.40	2.15	2.10	2.10
February	1.85	2.15	2.40	2.15	2.10	2.10
March	1.85	2.35	2.40	2.15	2.10	2.10
April	1.85	2.40	2.40	2.15	2.10	2.10
May	1.85	2.40	2.38	2.06	1.98	2.10
June	1.87	2.40	2.27	2.00	2.10	2.10
July	1.95	2.40	2.15	2.00	2.10	2.10
August	1.95	2.40	2.15	2.00	2.10	2.10
September	1.95	2.40	2.15	2.00	2.10	2.10
October	1.95	2.40	2.03	2.00	2.10	2.10
November	1.95	2.40	2.15	2.02	2.10	2.10
December	2.15	2.40	2.15	2.10	2.10	2.10
Average	1.92	2.35	2.25	2.06	2.09	2.10

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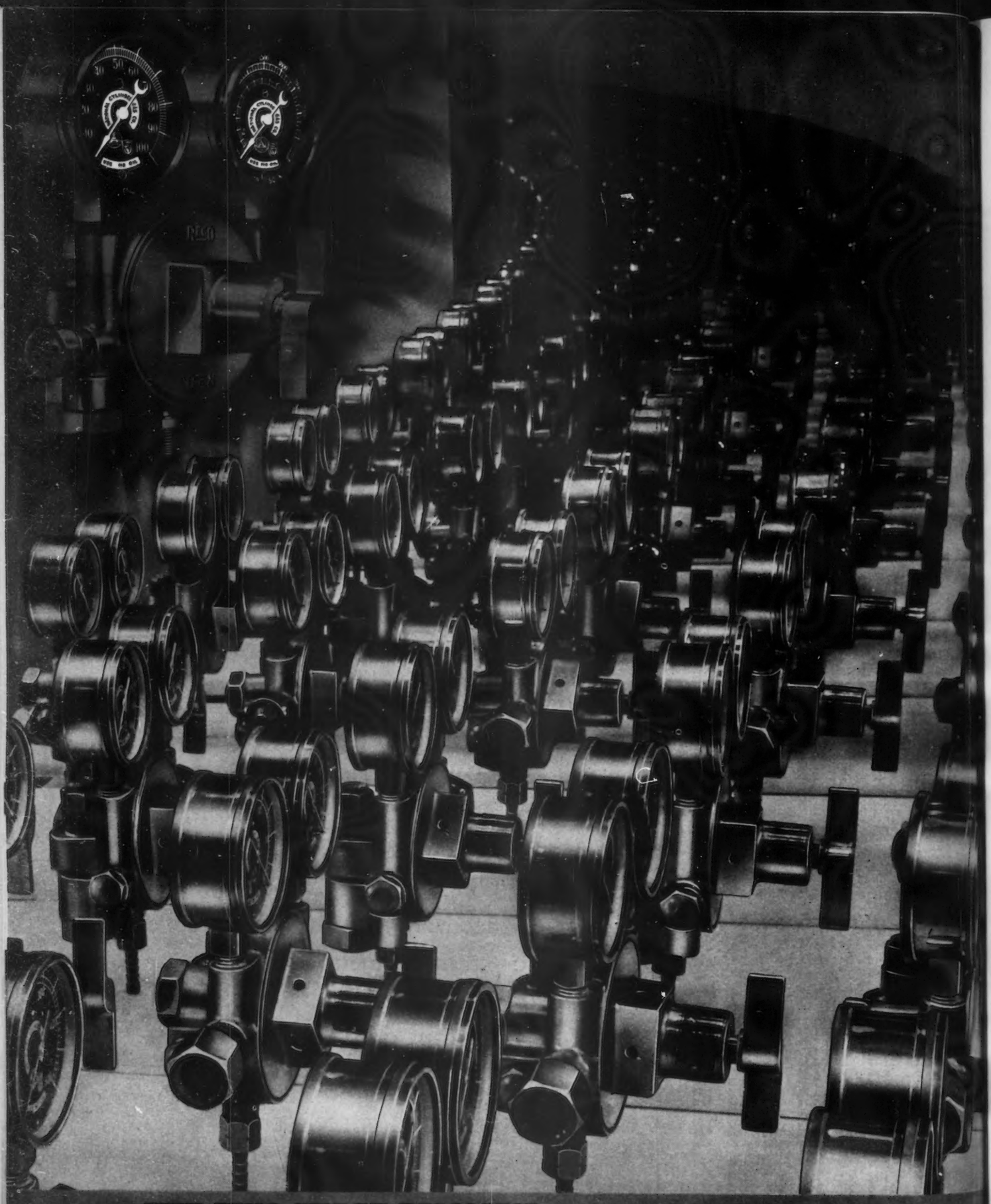

THE TWO-STAGE REGOLATOR . . . combines a nozzle type 1st stage with a stem type 2nd stage to produce a non-fluctuating welding flame.

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REGO . . . pioneer equipment for using and controlling high pressure gases . . . distributed by

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STATISTICAL

Cold-Rolled Sheets at Pittsburgh, Cents a Pound

	1929	1931	1932	1933	1934	1935
January	4.10	3.30	2.90	2.35	2.75	2.95
February	4.10	3.90	2.80	2.25	2.75	2.95
March	4.10	3.24	2.86	2.30	2.75	2.95
April	4.10	3.10	2.90	2.30	2.85	2.95
May	4.10	3.03	2.89	2.34	3.15	2.95
June	4.10	3.02	2.85	2.29	3.15	2.95
July	4.10	3.10	2.85	2.40	2.99	2.95
August	4.08	3.10	2.81	2.47	2.95	2.95
September	4.00	3.10	2.75	2.75	2.95	2.95
October	4.00	3.10	2.65	2.75	2.95	2.95
November	4.00	3.10	2.63	2.75	2.95	2.95
December	3.98	3.02	2.65	2.75	2.95	2.95
Average	4.06	3.13	2.80	2.48	2.96	2.95

	1936	1937	1938	1939	1940	1941
January	2.95	3.25	3.55	3.20	3.05	3.05
February	2.95	3.25	3.50	3.20	3.05	3.05
March	2.95	3.49	3.45	3.20	3.05	3.05
April	2.95	3.55	3.45	3.20	2.93	3.05
May	2.95	3.55	3.43	3.11	3.05	3.05
June	2.95	3.55	3.32	3.05	3.05	3.05
July	3.05	3.55	3.20	3.05	3.05	3.05
August	3.05	3.55	3.20	3.05	3.05	3.05
September	3.05	3.55	3.20	3.05	3.05	3.05
October	3.05	3.55	3.08	3.05	3.05	3.05
November	3.05	3.55	3.20	3.05	3.05	3.05
December	3.25	3.55	3.20	3.05	3.05	3.05
Average	3.02	3.49	3.31	3.10	3.04	3.05

—The Iron Age—

Hot-Rolled Strip at Pittsburgh, Cents a Pound

	1929	1931	1932	1933	1934	1935
January	1.80	1.55	1.41	1.45	1.75	1.85
February	1.80	1.55	1.40	1.45	1.75	1.85
March	1.80	1.55	1.40	1.45	1.75	1.85
April	1.90	1.55	1.40	1.45	1.81	1.85
May	1.90	1.55	1.40	1.49	2.00	1.85
June	1.90	1.55	1.41	1.55	2.00	1.85
July	1.90	1.55	1.45	1.60	1.88	1.85
August	1.90	1.55	1.45	1.64	1.85	1.85
September	1.90	1.55	1.45	1.68	1.85	1.85
October	1.90	1.54	1.45	1.75	1.85	1.85
November	1.90	1.50	1.45	1.75	1.85	1.85
December	1.90	1.49	1.45	1.75	1.85	1.85
Average	1.88	1.54	1.43	1.58	1.85	1.85

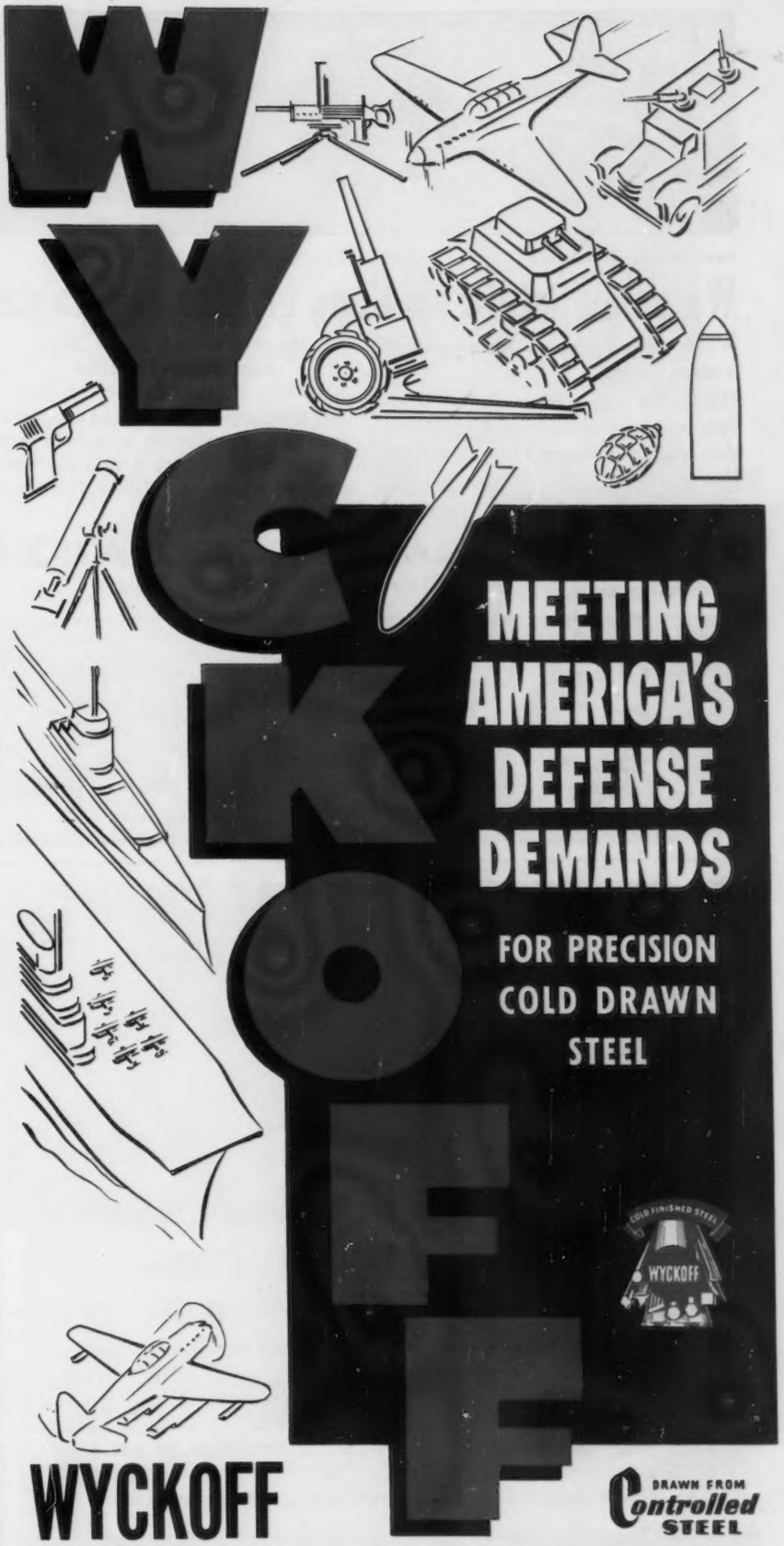
	1936	1937	1938	1939	1940	1941
January	1.85	2.15	2.40	2.15	2.10	2.10
February	1.85	2.15	2.40	2.15	2.10	2.10
March	1.85	2.35	2.40	2.15	2.10	2.10
April	1.85	2.40	2.40	2.15	1.98	2.10
May	1.85	2.40	2.38	2.06	2.10	2.10
June	1.85	2.40	2.27	2.00	2.10	2.10
July	1.95	2.40	2.15	2.00	2.10	2.10
August	1.95	2.40	2.15	2.00	2.10	2.10
September	1.95	2.40	2.15	2.00	2.10	2.10
October	1.95	2.40	2.03	2.00	2.10	2.10
November	1.95	2.40	2.15	2.02	2.10	2.10
December	2.11	2.40	2.15	2.10	2.10	2.10
Average	1.91	2.35	2.25	2.06	2.09	2.10

—The Iron Age—

Cold-Rolled Strip at Pittsburgh, Cents a Pound

	1929	1931	1932	1933	1934	1935
January	2.85	2.25	1.92	1.88	2.40	2.60
February	2.85	2.25	1.90	1.80	2.40	2.60
March	2.80	2.25	1.96	1.80	2.40	2.60
April	2.75	2.23	2.00	1.80	2.50	2.60
May	2.75	2.15	2.00	1.88	2.80	2.60
June	2.75	2.15	2.00	2.00	2.80	2.60
July	2.75	2.15	2.00	2.19	2.64	2.60
August	2.75	2.15	2.00	2.25	2.60	2.60
September	2.75	2.15	1.92	2.29	2.60	2.60
October	2.75	2.13	1.90	2.40	2.60	2.60
November	2.75	2.05	2.00	2.40	2.60	2.60
December	2.75	2.03	2.00	2.40	2.60	2.60
Average	2.77	2.16	1.97	2.09	2.58	2.60

	1936	1937	1938	1939	1940	1941
January	2.60	2.85	3.20	2.95	2.80	2.80
February	2.60	2.85	3.20	2.95	2.80	2.80
March	2.60	3.13	3.20	2.95	2.80	2.80
April	2.60	3.20	3.20	2.95	2.68	2.80
May	2.60	3.20	3.18	2.86	2.80	2.80
June	2.60	3.20	3.07	2.80	2.80	2.80
July	2.60	3.20	2.95	2.80	2.80	2.80
August	2.60	3.20	2.95	2.80	2.80	2.80
September	2.60	3.20	2.95	2.80	2.80	2.80
October	2.60	3.20	2.83	2.80	2.80	2.80
November	2.60	3.20	2.95	2.80	2.80	2.80
December	2.80	3.20	2.95	2.80	2.80	2.80
Average	2.62	3.14	3.05	2.86	2.79	2.80



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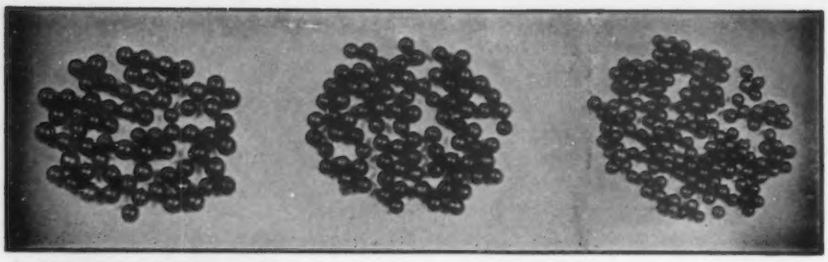

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We manufacture shot and grit for endurance

A shot or grit that will blast fast with a clean finish.

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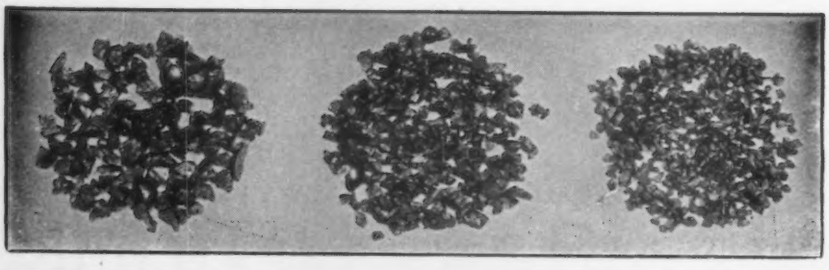
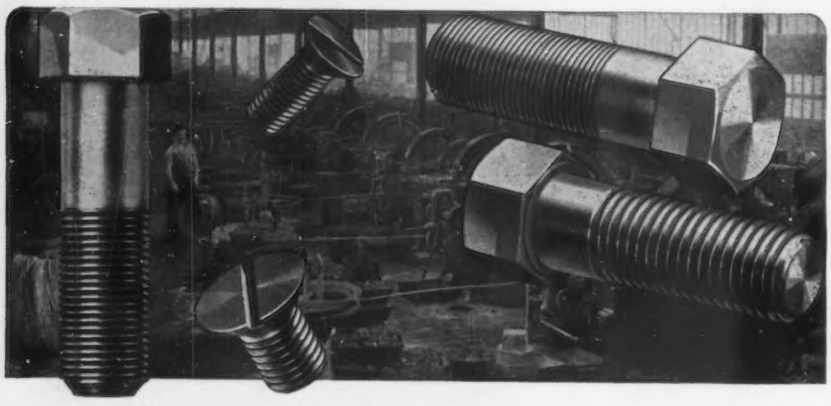
HARRISON ABRASIVE CORPORATION

MANCHESTER, NEW HAMPSHIRE

HEAT-TREATED STEEL GRIT





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STATISTICAL

Tin Plate at Pittsburgh, Dollars a Base Box

	1929	1931	1932	1933	1934	1935
January	$5.35	$5.00	$4.75	$4.25	$5.25	$5.25
February	5.35	5.00	4.75	4.25	5.25	5.25
March	5.35	5.00	4.75	4.25	5.25	5.25
April	5.35	5.00	4.75	4.25	5.25	5.25
May	5.35	5.00	4.75	4.25	5.25	5.25
June	5.35	5.00	4.75	4.25	5.25	5.25
July	5.35	5.00	4.75	4.25	5.25	5.25
August	5.35	5.00	4.75	4.25	5.25	5.25
September	5.35	5.00	4.75	4.65	5.25	5.25
October	5.35	4.75	4.75	4.65	5.25	5.25
November	5.35	4.75	4.55	4.65	5.25	5.25
December	5.35	4.75	4.25	5.25	5.25	5.25
Average	5.35	4.94	4.69	4.43	5.25	5.25

	1936	1937	1938	1939	1940	1941
January	$5.25	$4.85	$5.35	$5.00	$5.00	$5.00
February	5.25	4.85	5.35	5.00	5.00	5.00
March	5.25	4.85	5.35	5.00	5.00	5.00
April	5.25	5.35	5.35	5.00	5.00	5.00
May	5.25	5.35	5.35	5.00	5.00	5.00
June	5.25	5.35	5.35	5.00	5.00	5.00
July	5.25	5.35	5.35	5.00	5.00	5.00
August	5.25	5.35	5.35	5.00	5.00	5.00
September	5.25	5.35	5.35	5.00	5.00	5.00
October	5.25	5.35	5.35	5.00	5.00	5.00
November	5.25	5.35	5.18	5.00	5.00	5.00
December	5.25	5.35	5.00	5.00	5.00	5.00
Average	5.25	5.22	5.31	5.00	5.00	5.00

—The Iron Age—

Cold-Finished Steel Bars at Pittsburgh, Cents a Pound

	1929	1931	1932	1933	1934	1935
January	2.20	2.08	2.00	1.70	2.10	2.10
February	2.20	2.10	2.00	1.70	2.10	2.10
March	2.20	2.10	2.00	1.70	2.10	2.10
April	2.30	2.10	2.00	1.70	2.10	2.01
May	2.30	2.10	1.82	1.70	2.10	1.95
June	2.30	2.10	1.70	1.70	2.10	1.95
July	2.30	2.10	1.70	1.70	2.10	1.95
August	2.30	2.10	1.70	1.70	2.10	1.95
September	2.30	2.10	1.70	1.95	2.10	1.95
October	2.30	2.10	1.70	1.95	2.10	1.95
November	2.30	2.10	1.70	1.95	2.10	1.95
December	2.30	2.02	1.70	2.10	2.10	1.95
Average	2.28	2.09	1.81	1.80	2.10	1.99

	1936	1937	1938	1939	1940	1941
January	2.10	2.55	2.90	2.70	2.65	2.65
February	2.10	2.55	2.90	2.70	2.65	2.65
March	2.10	2.83	2.90	2.70	2.65	2.65
April	2.10	2.90	2.90	2.70	2.65	2.65
May	2.10	2.90	2.90	2.68	2.65	2.65
June	2.10	2.90	2.70	2.65	2.65	2.65
July	2.25	2.90	2.70	2.65	2.65	2.65
August	2.25	2.90	2.70	2.65	2.65	2.65
September	2.25	2.90	2.70	2.65	2.65	2.65
October	2.35	2.90	2.70	2.65	2.65	2.65
November	2.35	2.90	2.70	2.65	2.65	2.65
December	2.35	2.90	2.70	2.65	2.65	2.65
Average	2.20	2.84	2.78	2.67	2.65	2.65

—The Iron Age—

Steel Rails at Mill, Open-Hearth, Gross Ton

	1929	1931	1932	1933	1934	1935
January	$43.00	$43.00	$43.00	$40.00	$36.37	$36.37
February	43.00	43.00	43.00	40.00	36.37	36.37
March	43.00	43.00	43.00	40.00	36.37	36.37
April	43.00	43.00	43.00	40.00	36.37	36.37
May	43.00	43.00	43.00	40.00	36.37	36.37
June	43.00	43.00	43.00	40.00	36.37	36.37
July	43.00	43.00	43.00	40.00	36.37	36.37
August	43.00	43.00	43.00	40.00	36.37	36.37
September	43.00	43.00	43.00	40.00	36.37	36.37
October	43.00	43.00	42.25	39.55	36.37	36.37
November	43.00	43.00	40.00	36.38	36.37	36.37
December	43.00	43.00	40.00	36.38	36.37	36.37
Average	43.00	43.00	42.44	39.26	36.37	36.37

	1936	1937	1938	1939	1940	1941
January	$36.37	$39.00	$42.50	$40.00	$40.00	$40.00
February	36.37	39.00	42.50	40.00	40.00	40.00
March	36.37	41.80	42.50	40.00	40.00	40.00
April	36.37	42.50	42.50	40.00	40.00	40.00
May	36.37	42.50	42.50	40.00	40.00	40.00
June	36.37	42.50	42.50	40.00	40.00	40.00
July	36.37	42.50	42.50	40.00	40.00	40.00
August	36.37	42.50	42.50	40.00	40.00	40.00
September	36.37	42.50	41.25	40.00	40.00	40.00
October	36.37	42.50	40.00	40.00	40.00	40.00
November	36.37	42.50	40.00	40.00	40.00	40.00
December	39.00	42.50	40.00	40.00	40.00	40.00
Average	36.59	41.86	41.77	40.00	40.00	40.00

STATISTICAL

Merchant Bars at Pittsburgh, Cents a Pound

	1929	1931	1932	1933	1934	1935
January	1.90	1.64	1.50	1.60	1.75	1.80
February	1.90	1.65	1.50	1.60	1.75	1.80
March	1.90	1.65	1.52	1.60	1.75	1.80
April	1.95	1.65	1.60	1.60	1.79	1.80
May	1.95	1.65	1.60	1.60	1.90	1.80
June	1.95	1.65	1.60	1.60	1.90	1.80
July	1.95	1.63	1.60	1.60	1.82	1.80
August	1.95	1.60	1.60	1.60	1.80	1.80
September	1.94	1.60	1.60	1.60	1.80	1.80
October	1.90	1.60	1.60	1.75	1.80	1.85
November	1.90	1.60	1.60	1.75	1.80	1.85
December	1.90	1.58	1.60	1.75	1.80	1.85
Average	1.92	1.63	1.57	1.64	1.81	1.81

	1936	1937	1938	1939	1940	1941
January	1.85	2.20	2.45	2.25	2.15	2.15
February	1.85	2.20	2.45	2.25	2.15	2.15
March	1.85	2.40	2.45	2.25	2.15	2.15
April	1.85	2.45	2.45	2.25	2.15	2.15
May	1.85	2.45	2.45	2.19	2.15	2.15
June	1.85	2.45	2.41	2.15	2.15	2.15
July	1.95	2.45	2.25	2.15	2.15	2.15
August	1.95	2.45	2.25	2.15	2.15	2.15
September	1.97	2.45	2.25	2.15	2.15	2.15
October	2.05	2.45	2.25	2.15	2.15	2.15
November	2.05	2.45	2.25	2.15	2.15	2.15
December	2.05	2.45	2.25	2.15	2.15	2.15
Average	1.93	2.40	2.35	2.19	2.15	2.15

—The Iron Age—

Plain Wire, Base at Pittsburgh, Cents a Pound

	1929	1931	1932	1933	1934	1935
January	2.50	2.20	2.20	2.16	2.20	2.30
February	2.50	2.20	2.20	2.10	2.20	2.30
March	2.50	2.20	2.20	2.10	2.20	2.30
April	2.50	2.20	2.20	2.10	2.23	2.30
May	2.50	2.20	2.20	2.10	2.30	2.30
June	2.50	2.20	2.20	2.10	2.30	2.30
July	2.50	2.20	2.20	2.10	2.30	2.30
August	2.43	2.20	2.20	2.10	2.30	2.30
September	2.40	2.20	2.20	2.10	2.30	2.30
October	2.40	2.20	2.20	2.10	2.30	2.30
November	2.40	2.20	2.20	2.10	2.30	2.30
December	2.40	2.20	2.20	2.20	2.30	2.30
Average	2.46	2.20	2.20	2.11	2.27	2.30

	1936	1937	1938	1939	1940	1941
January	2.30	2.60	2.90	2.60	2.60	2.60
February	2.30	2.60	2.90	2.60	2.60	2.60
March	2.30	2.84	2.90	2.60	2.60	2.60
April	2.40	2.90	2.90	2.60	2.60	2.60
May	2.40	2.90	2.90	2.60	2.60	2.60
June	2.40	2.90	2.84	2.60	2.60	2.60
July	2.40	2.90	2.60	2.60	2.60	2.60
August	2.40	2.90	2.60	2.60	2.60	2.60
September	2.40	2.90	2.60	2.60	2.60	2.60
October	2.50	2.90	2.60	2.60	2.60	2.60
November	2.50	2.90	2.60	2.60	2.60	2.60
December	2.60	2.90	2.60	2.60	2.60	2.60
Average	2.41	2.84	2.74	2.60	2.60	2.60

—The Iron Age—

Structural Shapes at Pittsburgh, Cents a Pound

	1929	1931	1932	1933	1934	1935
January	1.90	1.64	1.50	1.60	1.70	1.80
February	1.90	1.65	1.50	1.60	1.70	1.80
March	1.90	1.65	1.52	1.60	1.70	1.80
April	1.95	1.65	1.60	1.60	1.74	1.80
May	1.95	1.65	1.60	1.60	1.85	1.80
June	1.95	1.65	1.60	1.60	1.85	1.80
July	1.95	1.63	1.60	1.60	1.81	1.80
August	1.95	1.60	1.60	1.60	1.80	1.80
September	1.95	1.60	1.60	1.60	1.80	1.80
October	1.90	1.60	1.60	1.70	1.80	1.80
November	1.90	1.60	1.60	1.70	1.80	1.80
December	1.90	1.50	1.60	1.70	1.80	1.80
Average	1.92	1.62	1.57	1.68	1.78	1.80

	1936	1937	1938	1939	1940	1941
January	1.80	2.05	2.25	2.10	2.10	2.10
February	1.80	2.05	2.25	2.10	2.10	2.10
March	1.80	2.21	2.25	2.10	2.10	2.10
April	1.80	2.25	2.25	2.10	2.10	2.10
May	1.80	2.25	2.25	2.10	2.10	2.10
June	1.80	2.25	2.22	2.10	2.10	2.10
July	1.90	2.25	2.10	2.10	2.10	2.10
August	1.90	2.25	2.10	2.10	2.10	2.10
September	1.90	2.25	2.10	2.10	2.10	2.10
October	1.90	2.25	2.10	2.10	2.10	2.10
November	1.90	2.25	2.10	2.10	2.10	2.10
December	1.90	2.25	2.10	2.10	2.10	2.10
Average	1.85	2.21	2.17	2.10	2.10	2.10

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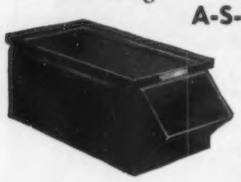

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STATISTICAL

No. 24 Gage Galvanized Sheets, at Pittsburgh, Cents a Lb.

	1929	1931	1932	1933	1934	1935
January	3.60	2.90	2.80	2.68	2.85	3.10
February	3.60	2.90	2.75	2.50	2.85	3.10
March	3.60	2.90	2.85	2.60	2.85	3.10
April	3.60	2.84	2.85	2.63	2.95	3.10
May	3.60	2.80	2.85	2.70	3.25	3.10
June	3.60	2.74	2.85	2.70	3.25	3.10
July	3.60	2.90	2.85	2.85	3.13	3.10
August	3.50	2.90	2.81	2.85	3.10	3.10
September	3.50	2.90	2.75	2.85	3.10	3.10
October	3.50	2.90	2.85	2.85	3.10	3.10
November	3.48	2.90	2.85	2.85	3.10	3.10
December	3.40	2.86	2.85	2.85	3.10	3.10
Average	3.55	2.87	2.83	2.74	3.05	3.10

	1936	1937	1938	1939	1940	1941
January	3.10	3.40	3.80	3.50	3.50	3.50
February	3.10	3.40	3.80	3.50	3.50	3.50
March	3.10	3.72	3.80	3.50	3.50	3.50
April	3.10	3.80	3.80	3.50	3.50	3.50
May	3.10	3.80	3.80	3.46	3.50	3.50
June	3.10	3.80	3.68	3.50	3.50	3.50
July	3.20	3.80	3.50	3.50	3.50	3.50
August	3.20	3.80	3.50	3.50	3.50	3.50
September	3.20	3.80	3.50	3.50	3.50	3.50
October	3.20	3.80	3.45	3.50	3.50	3.50
November	3.20	3.80	3.50	3.50	3.50	3.50
December	3.40	3.80	3.50	3.50	3.50	3.50
Average	3.17	3.73	3.64	3.50	3.50	3.50

—The Iron Age—

Standard Steel Pipe at Pittsburgh, Net Ton

Computed from list discounts, for carload lots; price for base size pipe, 1 to 3 in.; ¾ to 3 in. prior to April 13, 1931.

	1929	1931	1932	1933	1934	1935
January	$70.30	$66.50	$64.84	$65.00	$61.75	$68.40
February	70.30	66.50	64.84	65.00	61.75	68.40
March	70.30	66.50	64.84	65.00	61.75	68.40
April	70.30	66.50	64.84	58.00	63.41	68.40
May	70.30	63.59	64.84	58.00	68.40	68.40
June	70.30	64.84	64.84	58.00	68.40	68.40
July	70.30	64.84	64.84	61.75	68.40	68.40
August	70.30	64.84	64.84	61.75	68.40	68.40
September	70.30	64.84	65.00	61.75	68.40	68.40
October	70.30	64.84	65.00	61.75	68.40	68.40
November	70.30	64.84	65.00	61.75	68.40	68.40
December	70.30	64.84	65.00	61.75	68.40	68.40
Average	70.30	65.29	64.89	61.63	66.32	68.40

	1936	1937	1938	1939	1940	1941
January	$68.40	$61.00	$71.00	$63.00	$63.00	$63.00
February	64.98	61.00	71.00	63.00	63.00	63.00
March	61.80	69.00	71.00	63.00	63.00	63.00
April	61.00	71.00	71.00	63.00	63.00	63.00
May	61.00	71.00	71.00	63.00	63.00	63.00
June	61.00	71.00	71.00	63.00	63.00	63.00
July	61.00	71.00	63.00	63.00	63.00	63.00
August	61.00	71.00	63.00	63.00	63.00	63.00
September	61.00	71.00	63.00	63.00	63.00	63.00
October	61.00	71.00	63.00	63.00	63.00	63.00
November	61.00	71.00	63.00	63.00	63.00	63.00
December	61.00	71.00	63.00	63.00	63.00	63.00
Average	62.01	69.17	67.00	63.00	63.00	63.00

—The Iron Age—

Iron and Steel Imports, Gross Tons

	Iron and Steel (Ex Scrap)	Scrap	Total
1929	645,602	90,479	736,081
1930	499,798	27,482	527,280
1931	397,607	16,279	413,886
1932	361,665	9,775	371,440
1933	337,175	57,074	394,249
1934	254,113	44,421	298,534
1935	380,609	64,768	445,377
1936	591,841	159,321	751,162
1937	509,064	91,441	600,505
1938	267,573	27,387	294,960
1939	285,669	29,492	315,161
1940	55,277	2,026	57,303
1941	18,544*	46,975*	65,529*

* Nine months total.

STATISTICAL

Furnace Coke, Prompt Connellsville, Net Ton at Oven

	1929	1931	1932	1933	1934	1935
January	$2.75	$2.50	$2.25	$1.75	$3.60	$3.85
February	2.90	2.50	2.25	1.75	3.50	3.85
March	2.98	2.50	2.25	1.75	3.50	3.85
April	2.78	2.50	2.25	1.75	3.85	3.85
May	2.75	2.45	2.20	1.75	3.85	3.85
June	2.75	2.40	2.00	1.81	3.85	3.59
July	2.75	2.40	2.00	2.31	3.85	3.27
August	2.73	2.40	2.00	2.55	3.85	3.29
September	2.65	2.40	2.00	2.50	3.85	3.25
October	2.65	2.40	1.81	3.50	3.85	3.53
November	2.65	2.40	1.75	3.75	3.85	3.60
December	2.63	2.34	1.75	3.75	3.85	3.57
Average	2.75	2.43	2.04	2.41	3.79	3.61

	1936	1937	1938	1939	1940	1941
January	$3.65	$4.00	$4.00	$3.75	$4.20	$5.50
February	3.65	4.06	4.00	3.75	4.00	5.50
March	3.65	4.25	4.00	3.75	4.00	5.52
April	3.65	4.51	4.00	3.75	4.00	5.53
May	3.65	4.60	4.00	3.75	4.00	6.00
June	3.65	4.58	3.85	3.75	4.00	6.13
July	3.50	4.35	3.75	3.75	4.20	6.13
August	3.61	4.35	3.75	3.75	4.63	6.13
September	3.69	4.27	3.75	4.25	4.75	6.13
October	3.75	4.25	3.75	4.90	4.75	6.13
November	3.75	4.25	3.75	5.00	5.10	6.13
December	3.92	4.00	3.75	5.00	5.375	6.13
Average	3.68	4.29	3.86	4.09	4.42	5.92

The Iron Age

Foundry Coke, Prompt Connellsville, Net Ton at Oven

	1929	1931	1932	1933	1934	1935
January	$3.75	$3.50	$3.50	$2.50	$4.25	$4.60
February	3.75	3.50	3.50	2.50	4.25	4.60
March	3.75	3.50	3.50	2.50	4.25	4.60
April	3.75	3.50	3.50	2.50	4.60	4.60
May	3.75	3.50	3.10	2.50	4.60	4.60
June	3.75	3.50	3.00	2.56	4.60	4.15
July	3.75	3.50	3.00	2.94	4.60	3.88
August	3.75	3.50	2.90	3.15	4.60	4.00
September	3.75	3.50	2.75	3.25	4.60	4.00
October	3.75	3.50	2.75	4.05	4.60	4.20
November	3.75	3.50	2.75	4.25	4.60	4.25
December	3.50	3.25	2.69	4.25	4.60	4.15
Average	3.73	3.48	3.08	3.08	4.51	4.30

	1936	1937	1938	1939	1940	1941
January	$4.25	$4.50	$5.00	$4.75	$5.50	$5.75
February	4.25	4.50	5.00	4.75	5.31	5.75
March	4.25	4.50	5.00	4.75	5.25	5.85
April	4.25	5.00	5.00	4.75	5.25	5.62
May	4.25	5.25	5.00	4.75	5.25	6.72
June	4.25	5.25	4.85	4.75	5.25	6.88
July	4.00	5.00	4.75	4.75	5.25	6.88
August	4.00	5.00	4.75	4.75	5.25	6.88
September	4.05	5.00	4.75	5.12	5.25	6.88
October	4.25	5.00	4.75	5.65	5.25	6.88
November	4.25	5.00	4.75	5.75	5.625	6.88
December	4.40	5.00	4.75	5.75	5.75	6.88
Average	4.20	4.92	4.86	5.02	5.35	6.49

The Iron Age

Iron and Steel Exports, Gross Tons (Excluding Scrap)

1929	2,506,031	1933	582,950
1930	1,646,061	1934	996,911
1931	848,690	1935	982,910
1932	378,415	1936	1,280,205

	1937	1938	1939	1940	1941
Jan.	132,809	230,513	137,238	396,064	653,798
Feb.	147,789	215,013	136,986	436,585	525,862
Mar.	214,573	192,091	164,137	457,052	512,844
April	262,208	182,349	156,317	391,754	515,657
May	338,541	168,883	149,998	471,481	409,840
June	311,984	151,526	191,535	617,578	398,667
July	469,382	138,300	166,415	707,809	478,016
Aug.	412,445	135,255	186,732	1,046,084	617,477
Sept.	290,995	198,833	247,889	965,444	641,094
Oct.	338,065	203,961	257,192	846,584	.....
Nov.	302,520	198,203	334,262	713,827	.....
Dec.	307,393	168,704	396,139	735,178	.....
Year	3,528,704	2,183,631	2,524,840	7,785,540	4,753,255*

* Nine month's total.

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Electrolytic Copper, Conn. Valley, Cents a Pound

	1929	1930	1931	1932	1933	1934
January	16.84	18.00	10.03	7.33	5.00	8.18
February	18.05	18.00	9.96	6.25	5.00	8.00
March	21.38	18.00	10.14	5.99	5.26	8.00
April	19.93	15.87	9.69	5.79	5.68	8.39
May	18.00	12.96	8.94	5.51	6.93	8.50
June	18.00	12.37	8.31	5.39	8.00	8.82
July	18.00	11.27	7.93	5.28	8.91	9.00
August	18.00	10.92	7.52	5.43	9.00	9.00
September	18.03	10.57	7.26	6.21	9.00	9.00
October	18.00	9.63	7.01	5.97	8.25	9.00
November	18.00	10.37	6.80	5.31	8.16	9.00
December	18.00	10.61	6.85	5.04	8.12	9.00
Average	18.35	13.23	8.37	5.79	7.28	8.66

	1935	1936	1937	1938	1939	1940	1941
January	9.00	9.25	12.66	10.42	11.25	12.22	12.00
February	9.00	9.25	13.60	10.00	11.25	11.40	12.00
March	9.00	9.25	15.99	10.00	11.25	11.38	12.00
April	9.00	9.40	15.35	10.00	10.47	11.33	12.00
May	9.00	9.50	14.00	9.60	10.06	11.32	12.00
June	8.88	9.50	14.00	9.00	10.00	11.37	12.00
July	8.00	9.60	14.00	9.81	10.22	10.81	12.00
August	8.22	9.75	14.00	10.12	10.49	10.95	12.00
September	8.77	9.75	13.78	10.25	11.93	11.54	12.00
October	9.19	9.85	12.06	10.98	12.44	12.00	12.00
November	9.25	10.43	11.02	11.25	12.50	12.00	12.00
December	9.25	11.00	10.24	11.25	12.50	12.00	12.00
Average	8.88	9.71	13.39	10.22	11.20	11.53	12.00

The Iron Age

Zinc at New York, Cents a Pound

	1929	1931	1932	1933	1934	1935
January	6.70	4.37	3.38	3.38	4.62	4.08
February	6.70	4.36	3.19	3.04	4.73	4.06
March	6.80	4.30	3.16	3.37	4.72	4.25
April	7.04	4.06	3.10	3.63	4.72	4.38
May	6.98	3.66	2.90	4.17	4.71	4.60
June	7.00	3.75	3.16	4.70	4.59	4.67
July	7.10	4.25	2.92	5.24	4.88	4.70
August	7.15	4.17	3.13	5.28	4.63	4.92
September	7.15	4.09	3.68	5.08	4.43	5.04
October	7.09	3.73	3.41	5.12	4.19	5.21
November	6.63	3.55	3.46	4.87	4.08	5.23
December	6.09	3.50	3.50	4.82	4.06	5.22
Average	6.87	3.98	3.25	4.40	4.51	4.70

	1936	1937	1938	1939	1940	1941
January	5.22	6.20	5.35	4.89	6.03	7.65
February	5.23	6.80	5.17	4.89	5.93	7.65
March	5.27	7.75	4.77	4.89	6.14	7.65
April	5.27	7.70	4.53	4.89	6.14	7.65
May	5.27	7.10	4.43	4.89	6.20	7.65
June	5.26	7.10	4.53	4.89	6.63	7.65
July	5.16	7.27	5.14	4.91	6.64	7.85
August	5.17	7.56	5.14	5.11	6.79	7.65
September	5.22	7.54	5.24	6.51	7.33	7.65
October	5.22	6.45	5.40	6.89	7.64	8.36
November	5.35	5.98	5.12	6.89	7.64	8.65
December	5.64	5.36	4.89	6.46	7.65	8.65
Average	5.27	6.90	4.98	5.51	6.73	7.88

The Iron Age

Lead at New York, Cents a Pound

	1929	1931	1932	1933	1934	1935
January	6.65	4.80	3.75	3.00	4.00	3.69
February	6.85	4.55	3.72	3.00	4.00	3.53
March	7.41	4.53	3.15	3.15	4.00	3.58
April	7.19	4.42	3.00	3.27	4.18	3.89
May	7.00	3.82	3.00	3.65	4.14	3.96
June	7.00	3.92	2.99	4.17	3.98	4.02
July	6.80	4.40	2.73	4.46	3.77	4.12
August	6.75	4.40	3.24	4.50	3.75	4.25
September	6.88	4.40	3.47	4.50	3.68	4.41
October	6.87	3.97	3.05	4.32	3.65	4.51
November	6.29	3.94	3.04	4.29	3.57	4.50
December	6.25	3.80	3.00	4.14	3.60	4.50
Average	6.83	4.24	3.18	3.87	3.86	4.06

	1936	1937	1938	1939	1940	1941
January	4.50	6.00	4.87	4.83	5.47	5.50
February	4.51	6.23	4.63	4.80	5.08	5.60
March	4.60	7.19	4.50	4.82	5.19	5.77
April	4.60	6.32	4.50	4.78	5.07	5.85
May	4.60	6.00	4.40	4.75	5.02	5.85
June	4.60	6.00	4.15	4.80	5.00	5.85
July	4.60	6.00	4.88	4.85	5.00	5.85
August	4.60	6.45	4.90	5.04	4.85	5.85
September	4.60	6.40	5.00	5.45	4.93	5.85
October	4.63	5.75	5.10	5.50	5.31	5.85
November	5.11	5.03	5.09	5.50	5.73	5.85
December	5.55	4.87	4.84	5.50	5.50	5.85
Average	4.71	6.02	4.74	5.05	5.18	5.79

STATISTICAL

Straits Tin at New York, Cents a Pound

	1929	1931	1932	1933	1934	1935
January	49.21	26.03	21.80	22.70	51.98	50.91
February	49.39	26.27	21.97	23.51	51.78	49.99
March	48.85	27.02	21.81	24.35	53.84	46.88
April	45.93	25.13	19.17	27.16	55.66	50.05
May	43.88	23.16	20.90	35.94	53.57	51.10
June	44.20	23.53	19.58	44.23	51.31	51.08
July	46.29	24.96	20.89	46.28	51.94	52.31
August	46.60	25.73	22.98	44.71	51.99	50.46
September	45.32	24.51	24.76	46.46	51.52	49.05
October	42.25	22.72	23.91	47.95	51.01	51.25
November	40.18	22.78	23.31	53.14	51.24	51.88
December	39.87	21.28	22.70	52.91	50.92	49.77
Average	45.16	24.43	21.98	39.12	52.23	50.39

	1936	1937	1938	1939	1940	1941
January	47.23	50.90	41.54	46.39	46.73	50.16
February	47.94	52.10	41.23	45.64	45.85	51.41
March	48.00	62.74	41.16	46.17	47.07	52.07
April	46.97	59.02	38.41	47.16	46.96	52.03
May	46.31	55.64	36.83	49.00	51.51	52.18
June	42.24	55.88	40.36	48.81	54.64	52.68
July	42.96	59.34	43.38	48.53	51.61	53.41
August	42.57	59.40	43.26	48.80	51.21	52.45
September	44.77	58.64	43.40	Nom.	50.30	52.00
October	44.95	51.52	45.25	55.68	51.50	52.00
November	51.30	43.34	46.29	52.65	50.57	52.00
December	51.85	42.96	46.21	51.40	50.11	52.00
Average	46.42	54.29	42.28	49.11	49.84	52.03

—The Iron Age—

Magnesium Cents a Lb., 99.8%, at New York

1929	56	1934	26	1938	30
1930	48	1935	30	1939	27
1931	34	1936	30	1940	27
1932	29	1937	30	1941	27
1933	28				

—The Iron Age—

Virgin Aluminum, 99% Plus, Delivered Cents a Lb.

	1929	1930	1931	1932	1933	1934	1935
January	23.90	24.30	23.30	23.30	23.30	23.30	20.50
February	23.90	24.30	23.30	23.30	23.30	21.65	20.50
March	23.90	24.30	23.30	23.30	23.30	21.65	20.50
April	23.90	24.30	23.30	23.30	23.30	21.65	20.50
May	23.90	24.30	23.30	23.30	23.30	21.65	20.50
June	23.90	24.16	23.30	23.30	23.30	21.65	20.50
July	23.90	23.30	23.30	23.30	23.30	21.65	20.50
August	23.90	23.30	23.30	23.30	23.30	21.65	20.50
September	23.90	23.30	23.30	23.30	23.30	21.65	20.50
October	23.90	23.30	23.30	23.30	23.30	21.49	20.50
November	23.90	23.30	23.30	23.30	23.30	20.50	20.50
December	23.90	23.30	23.30	23.30	23.30	20.50	20.50
Average	23.90	23.79	23.30	23.30	23.30	21.58	20.50

	1936	1937	1938	1939	1940	1941
January	20.50	20.50	20.00	20.00	20.00	17.00
February	20.50	20.50	20.00	20.00	20.00	17.00
March	20.50	20.00	20.00	20.00	20.00	17.00
April	20.50	20.00	20.00	20.00	20.00	17.00
May	20.50	20.00	20.00	20.00	20.00	17.00
June	20.50	20.00	20.00	20.00	20.00	17.00
July	20.50	20.00	20.00	20.00	20.00	17.00
August	20.50	20.00	20.00	20.00	20.00	17.00
September	20.50	20.00	20.00	20.00	20.00	17.00
October	20.50	20.00	20.00	20.00	20.00	15.00
November	20.50	20.00	20.00	20.00	20.00	15.00
December	20.50	20.00	20.00	20.00	20.00	15.00
Average	20.50	20.08	20.00	20.00	20.00	16.87

—The Iron Age—

Data for Other Years

Price and production data for years preceding 1929 were published in THE IRON AGE Statistical Supplement, Jan. 4, 1940.

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Metallurgy Fights on Two Fronts

(CONTINUED FROM PAGE 110)

some of the above mixtures when working at 200 deg. C. and using a current density of 1 amp. per sq. dm.

In surveying the results of workers who have used fused salt mixtures, best results seem to have been obtained in the presence of a high concentration of the aluminum salt, and the use of low current densities and potentials. It has been suggested that the superposition of 10 per cent a.c. on the d.c. current favors formation of smooth deposits. This may be caused by an improvement in the aluminum ion concentration gradient at the cathode. Stirring the bath should perhaps function similarly.

Silver being one important metal now readily available, it will undoubtedly come into widespread use in 1942, particularly as an electroplate. The government has extremely large stocks of silver on hand and current production is high. For instance, preliminary figures show that the total mine production of recoverable silver in the United States in 1940 was 8 per cent in excess of that of 1939. This trend is ascribed to the rise in the output of copper, zinc-lead, and lead ores.

The economic aspects as well as the technical problems involved in silver plating have been set forth in excellent detail by Adolph Bregman.[18]

It has been determined that smooth, dense and adherent deposits of silver measuring 0.05 in. thick can be plated on low carbon steel. Thorough preliminary cleaning or treating is necessary, and the silver plate should be preceded by a copper plate or silver strike.

It has been demonstrated that (1) silver plating of commercial steel can be done at a cost that is comparable with that of base-metal finishing; (2) that very thin pore free silver coatings can be obtained by the use of proper basis metal, proper pre-treatment and careful electroplating technique; and (3) that such deposits can be made either before or after the steel article is fabricated.

CONTINUATION

In a word it is possible to use silver plate to make up for the lack of nickel and chromium at this time.

Silver coating on non-metals has been considered in detail by Hepburn.[19] The silvering of glass and other non-conductors affords a starting point for the electro-metallizing of non-metallic surfaces. At present graphite and bronze powder are commonly used.

Electrodeposition of copper over silvered glass is used for backing up the silver coating of mirrors, for strengthening glass vessels and for electroforming metallic mirrors, the latter being subsequently stripped from the glass mold. The advantages of silvering, as compared with graphite or bronze, is that the silver coating uniformly coats objects and renders the entire surface conducting.

Three formulas for silvering are discussed: The cane sugar formula (Brashear); the formaldehyde formula, and the Rochelle salt formula.

Mr. Hepburn emphasizes the importance of priming the surface, before silvering, with a 5 to 10 per cent solution of stannous chloride which is subsequently rinsed off. The stannous chloride adsorbed on the surface produces silver nuclei by reduction, which initiate the silvering process.

The Rochelle salt formula is usually used hot, but if the priming solution is used before silvering, the operation can be conducted in the cold. A freshly silvered surface can be immersed in a fresh silvering solution to receive a thicker deposit.

The thickness of silver deposited during the first min. is about 0.000001 in. After 10 min., the thickness is about 0.000006 in. and does not further increase. To provide better adhesion to a subsequently applied electrodeposit, the silvered surface is "quicked" by dipping in a dilute mercurous cyanide solution.

D. W. Rudorff has reviewed a German method in which chromizing is carried out by a gaseous diffusion process. The surface is exposed to an atmosphere containing chromous chloride. Chromizing is not intended to eliminate employment of non-rusting steel; nevertheless, chromized low carbon or low alloyed steels will be found extremely useful in cases where their superior cold and hot working properties are an advantage. A good example in this respect is the

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Tensile Strength	75,000 to 90,000	Magnetic Properties	Non-magnetic
Yield Point	35,000 to 45,000	Thermal Conductivity (C.G.S.)	0.030
Elongation in 2"	25.0 to 40.0%	Specific Gravity	7.85
Reduction of Area	25.0 to 40.0%	Specific Heat—Room Temperature	0.12
Brinell Hardness	145 to 175	Mean Coefficient of Thermal Expansion 32° F.—212° F.	0.0000085
Impact Value (Izod)	40 to 80 ft. lbs.		

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very difficult fabrication of seamless thin-walled tubing from stainless steel. In this case fabrication can be greatly facilitated by drawing the tubes from unalloyed or low alloyed low carbon steel and then subjecting the drawn tubing to chromium impregnating process. Another important field of application is the manufacture of turbine blades, particularly the blades for exhaust gas turbines in which high temperature strength must be combined with nonscaling properties. Another application of the chromizing process is in the manufacture of chromium impregnated bolts.

The surface preparation for painting aluminum alloys on aircraft has been described by Wray, of the Aluminum Co. of America. In a number of accelerated salt water and atmospheric exposure tests, two types of surface treatment of aluminum alloys were found to be outstanding. These were coatings produced by anodic oxidation and coatings produced by certain chemical treatments. The latter comprises oxidation by immersion in a hot solution of sodium carbonate and potassium dichromate for about 10 to 20 min. followed by a sealing treatment in hot 5 per cent potassium dichromate solution. These treatments are designed as Alrok procedure No. 12 for wrought alloys and No. 714 for cast alloys. Of the various anodic coatings, Alumilite treatment No. 205 appears to be among best in case of wrought alloys and No. 710 in the case of cast alloys.

Comparison is made of these two treatments by Mr. Wray, and the conclusion is drawn that paint adherence with severe wetting and drying is almost as good on aluminum alloy surfaces treated by means of the Alrok process as on surfaces given an Alumilite treatment. Alrok should prove an adequate treatment prior to painting for aluminum alloy surfaces used in aircraft and aircraft engines, with possible exception of pontoons and bottoms of flying boats.

Labor's Fight for Power

(CONTINUED FROM PAGE 75)

dropped in importance. That leaves Murray and Lewis on top, with Sidney Hillman alined ideologically with Murray and bitter toward Burly John. Hillman's influence in the CIO has diminished because of the agreement to give AFL building trades unions government defense building contracts. Phil Murray has the most widely respected reputation of them all. He is regarded as a conciliatory wiz, a man of his word, and a man of iron when it comes to fighting for a union goal. Lewis hasn't the finesse of Murray, but he has the fight, which has made him the hero of most unionists, and he still has enough personal appeal so that he could, conceivably, win back control of the CIO by switching his stand on the foreign policy. He has already made a gesture in this direction when he finally won the captive mines dispute on the same day that Japan attacked the United States. There may well be a fight between him and Murray for control. And this time it will be a fight, for Murray now stands on his own feet.

A number of factional leaders firmly believe that Lewis may break away completely from the CIO, just as he did from the AFL, and start a third labor party. Lewis loves power, realizes his ability to command the imagination of many followers, has political ambitions—and if he finds that Murray definitely has the CIO in his pocket, Lewis is likely to leave and take his faction with him.

Though Murray has the reputation of being the most enlightened of labor leaders, he can and does fight for unionization as fiercely and shrewdly as Lewis. Witness his reply to President Roosevelt's letter to the CIO convention when

it met in Detroit last November. The President wrote: "In my message to the American Federation of Labor convention I said, as I say to the Congress of Industrial Organizations' convention: 'In this hour when civilization itself is in the balance, organizational rivalries and jurisdictional conflicts should be discarded.'"

Mr. Murray's reply stated in part: "National unity is, of course, essential today. All sections of the labor movement, management and government must be wholeheartedly behind our national program. The strengthening and growth of labor unions would establish the morale necessary for the attainment of this end. Greater participation by labor in the national defense program and a more active participation of labor in government are essential.

"It is the sincere conviction of the Congress of Industrial Organizations that with the adoption of the Industry Council Plan would be created the national unity which all Americans are striving to obtain."

Murray's answer proves that he is first and last a labor man. He says that management and government along with labor must be united behind the program. He flatly states that the strengthening of labor unions would attain this end, which is assuming that no other factor but that of labor morale is requisite to national defense. And it openly urges the adoption of the Industry Council Plan, of which Murray is the parent, as the specific method of achieving national unity for defense.

Unions Watch Congress

Union leaders confided long before actual war was declared that they expected restrictive legislation in 1942. Their main job now is to see that what laws are passed are not too restrictive. They remember that during the Civil War we had statutes which outlawed unions.

With war here they are even more fearful. They wasted no time in putting Allan Haywood, CIO director of organization, on a national radio hook-up the evening of the same day Congress declared war on Japan. Haywood asked the nation's listeners to write their congressmen and the President,

1854 ——— ——— *1942*

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ANY METAL • ANY PERFORATION

Industrial—Well balanced screens of excellent material and workmanship to assure maximum screen production combined with durability.

Ornamental—Approved patterns and finishes including many exclusive and characteristic designs for grilles and furniture. We invite your inquiries.

The Harrington & King Perforating Co.

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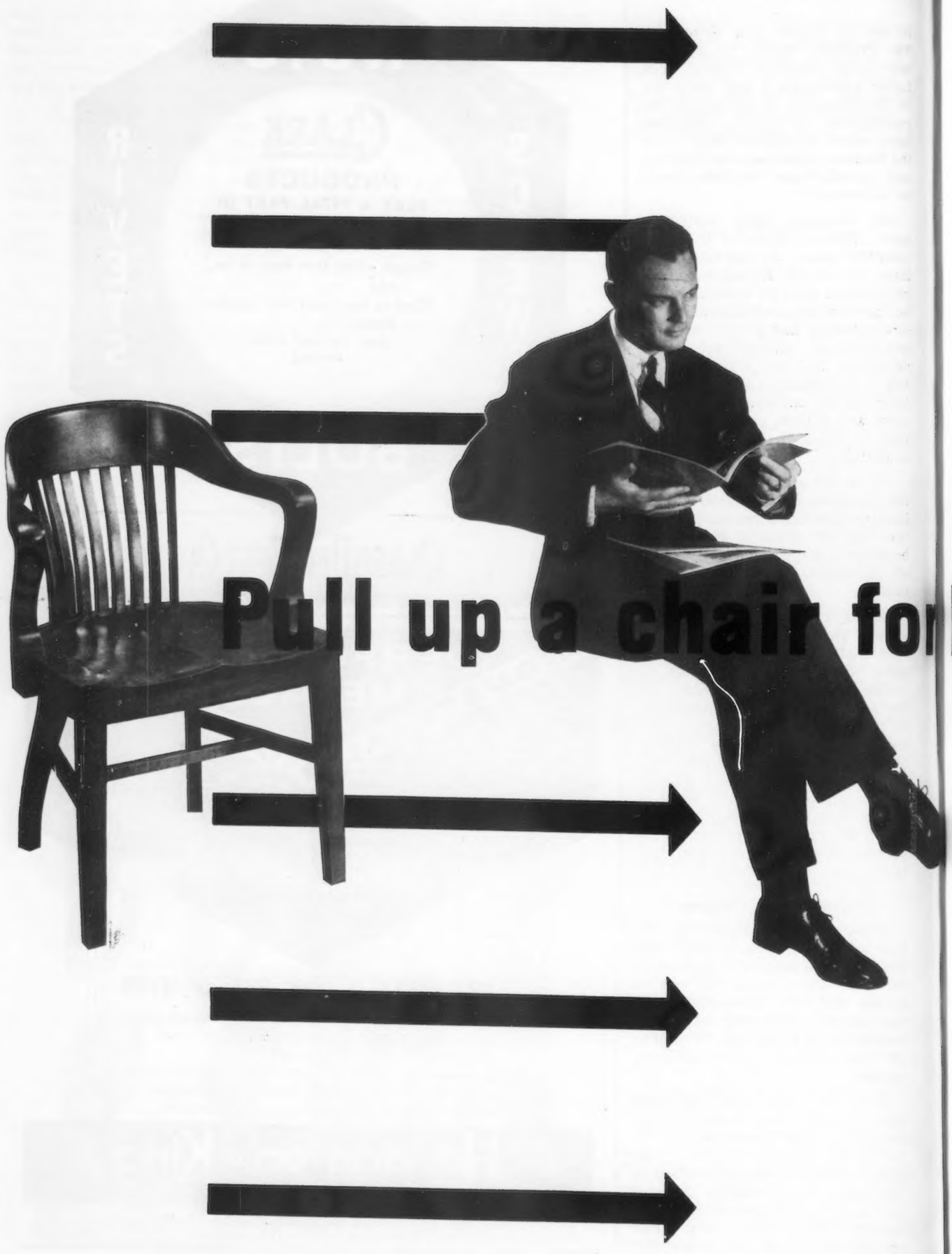
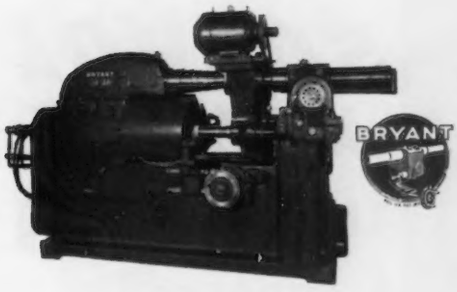

Pull up a chair for B

or Bryant

WHEN your desk is snowed under with problems, production plans and blueprints, pull up a chair for Bryant. Every phase of a new job that relates to internal grinding is a phase that interests Bryant. Every angle and opportunity whereby time, money, stock or operations can be saved on these phases is a chance for Bryant to help you.



Bryant productive capacity has already been trebled and is constantly increasing to aid defense production. Bryant engineering service has also been stepped up — stepped up not only to meet the urgent needs of armament, but the equally vital problem of planning new products that can be made economically and sold at a profit when peace returns once more.

This is an added reason for the forward-looking executive to "pull up a chair for Bryant."

BRYANT CHUCKING GRINDER CO.

SPRINGFIELD, VERMONT, U. S. A.

urging that favorable legislation be given labor during the war. He argued that there could be no successful prosecution of the war without labor's support. He stumped for Murray's plan as the most enlightened way of keeping industrial strife out of the war program; and he asked the nation to write Washing in support of that.

It is a safe bet to assume that one of the immediate CIO goals has now been shelved indefinitely. That is the announced drive to unionize the South. This would and will be the toughest labor job ever attempted, for the Southern character is definitely one that will not stand for the pushing around that has accompanied organizational drives in recent years. And that character would rise to greater heights of wrath during a war. So, deeply bitter as they are to such Southern congressmen as Dies and Connally of Texas, Smith of Virginia and Cox of Georgia, union leaders won't attempt this job now.

With only about 20 per cent of the nation's 45,000,000 workers organized, the biggest union job is still getting the names on the membership rolls. Though both CIO and AFL each claim over 5,000,000 members, the NLRB estimates that no more than 9,000,000 are unionists today.

One of the very toughest of all inside union problems, which only a few leaders will admit, is that of collecting the dues regularly. The drives have added many names to the rolls, but the boys are getting increasingly careless about paying up. This will grow worse now that we are in the war, unless "maintenance of membership" is granted, which is not at all likely now. This problem and also frequent demonstrations of inability to control the rank and file are the practical reasons why the closed shop or its nearest form is and will be sought so avidly now. Whether workers actually want the closed shop is an open question. There is the case of one steel company now engaged in union contract negotiations which saw three of its employees who were members of the SWOC's grievance committee actually approach a company official privately to urge him not to sign a closed shop contract.

On the other hand, there is the growing feeling of the nation, shared by all groups and best expressed in this incident, which runs opposite to the one just mentioned. A lad who received his college degree in June, 1940, went to work in the mill for one of the largest steel companies. Last spring the steel industry granted a 10c. an hour increase at a time when labor trouble was a looming threat. The lad told the company's industrial relations director, "I've been in the mill for almost a year, and so far as I know no one has ever known that I worked there. Now I got this wage increase and I know it's due to the union. Maybe I ought to join myself."

The same company executive in relating the incident, parenthetically amended on his own: "Americans as a whole are thinking that

Highspeed SHELL TURNING with *cemented carbide tools* and scores of other tough metal-working operations function better with this genuine new development.

Stuart's Solvol Liquid Cutting Compound, unique in the field of tool lubricants, is already in wide use at many of America's largest and best known munitions plants. It is solving cutting problems and definitely doing its part in speeding up production. Try it quickly and benefit by the obvious improvement and economy.

Photos Courtesy of International Harvester Company

Wire for production sample—free to any concern working on defense.

For All Cutting Fluid Problems
D. A. STUART OIL CO.
Chicago, U.S.A. • LIMITED • Est. 1865
Warehouses in All Principal Metal Working Centers

way more and more, and that includes business executives. Increased labor organization is a permanent development — our mutual job is to see that it's reached on a sensible solid basis."

An Age-Old Problem

The growing belief that increased unionization is inevitable is possibly due more to what is going on about us than to sincere but abstract conclusions. The trouble with the labor "problem" is that it is the age-old problem of humanity itself. Man has always been fighting for some new kind of order. What he really wants are improvements —not a switch to something brand new. The elements of wealth, power, advantage, position have always been a cause of struggle—with the crusade always trying to take a new kind of dress. What all really want in this labor question is not more or less unionization, not an open or a closed shop—but the increase of man's fundamental stature. Whatever steps are taken should have only this in mind. But man won't reach this in 1942 or in many years thereafter. Labor and industry will continue to oppose each other—but under a protective ceiling of better understanding. Only out of this opposition will man's basic rights be protected.

The greatest contribution industry can make to the whole cause is to see that no unfair advantage is taken of the labor movement during this time of stress. If laws and public sentiment swing too far to the other extreme, as much damage can be created by unfair labor legislation as has been done by the unjust "get-industry" pattern of recent years.

If business helps stabilize its labor relations by not resorting to recriminations as long as the war lasts, it will reap the benefits of such a policy in the future. Much of what labor does after the war is over will depend on what is done to labor now.

Industry cannot forget that the American labor movement has really just begun. Its struggle will not stop. Whether its present goal of the closed shop is basically right, or whether it will ever be obtained cannot be decided now. If other aims are more for the permanent good of labor than those it now holds, it will not be voluntarily persuaded to change by cracking it over the head. These tactics have not convinced American workmen or American industry that the closed shop is the ultimate end. Agreements reached out of fear and pressure are always temporary. Industry will serve itself and the whole cause best in this emergency by exercising intelligent tolerance rather than malice.

The goal won't be crossed for a long time. There will be labor trouble in this new year, though not as violent nor as concentrated as in the last. For the entire nation will be working together on a bigger goal; and the enforced quiet on the labor front is likely to see considerable solidifying of the movement to everyone's advantage.

Mathews CAN HELP YOU *Speed* PRODUCTION

• Today — the call to arm demands speed . . . and more speed. Mathews has had over a quarter of a century of experience working with the steel industry. That experience is available to you today.

One of 30 Mathews experienced Field Engineers is near you with ready and able service.

INCREASED CAPACITY FOR NATIONAL DEFENSE

Our plant capacity has been increased over 65% to care for the rising demands of the National Defense Program — plus the normal demands of peacetime production.

All orders, whether subject to Defense priorities or not, are given the same helpful care and attention that have always marked our dealings with prospects and customers in the past.

MATHEWS CONVEYER COMPANY

114 TENTH ST. - - - - - ELLWOOD CITY, PA.

Field Engineers and Sales Offices located in 30 Industrial Centers.

Detroit In Transition

(CONCLUDED FROM PAGE 91)

miles on a gallon of gas won't be salable," is his forecast.

Other obvious and easily predicted advances will be in commercial aircraft and engines and private aircraft, all of which will gain immeasurably just as the wireless and aircraft did in the last war.

The substitution program in the automotive industry has really been only a speeding up of the normal process employed there. New and better and cheaper materials are constantly being sought, and the day-to-day substitution of better production methods has been the habit of the industry. Perhaps these alternate materials and production methods are worthy of an exhaustive study now, but they have been discussed in these pages within the last year. The panorama of substitute materials in the next year may be even more exciting and will deserve frequent scanning; perhaps day-to-day checking will be needed to keep posted.

Because the demand for automotive products is cyclic in nature —following a seemingly immutable curve up and down during the years, it seems—the present artificial restrictions on output cannot help but build up a huge backlog of demand that will stimulate post-war manufacturing. The most recent count shows that 4,675,000 passenger cars of the 25,368,000 cars on the road are more than 10 years old. These older cars, and many of the newer ones which are being utilized to their maximum each day, will be worn out before the war program is completed. Annually, an average of 2,300,000 cars are scrapped and must be replaced. Replacements, plus new car demand that will arise, assures a backlog for the industry after the war is over.

NB LIONITE—*the* BEST ABRASIVE GRAIN *to use with* CEMENTS

For those tough polishing jobs which closely approach grinding, NB LIONITE is the perfect grain. The increase in the use of modern cements on such operations suggests the use of a grain similar to that used in grinding wheels. NB Lionite is a tough, polyhedral grain and, our methods of manufacture maintain rigid uniformity from lot to lot.

Records of recent tests in many plants now using cements show increases in production ranging from 25% to 100% when NB LIONITE is substituted for ordinary polishing grains.

For finishing operations, we recommend ST LIONITE grains. Their chemical treatment, polyhedral shape, accurate grading and uniformity from lot to lot insure fine finishes and highest efficiency. ST LIONITE lends itself well to "greasing" with oils, waxes, tallows, etc., a necessary step in many finishing operations. Supplied in sizes 100 to 240 inclusive.

DELIVERIES: Shipments are usually made within 24 hours after receipt of order.

SALES REPRESENTATIVES in All Principal Cities.

GENERAL ABRASIVE CO., INC.
NIAGARA FALLS, NEW YORK U. S. A.

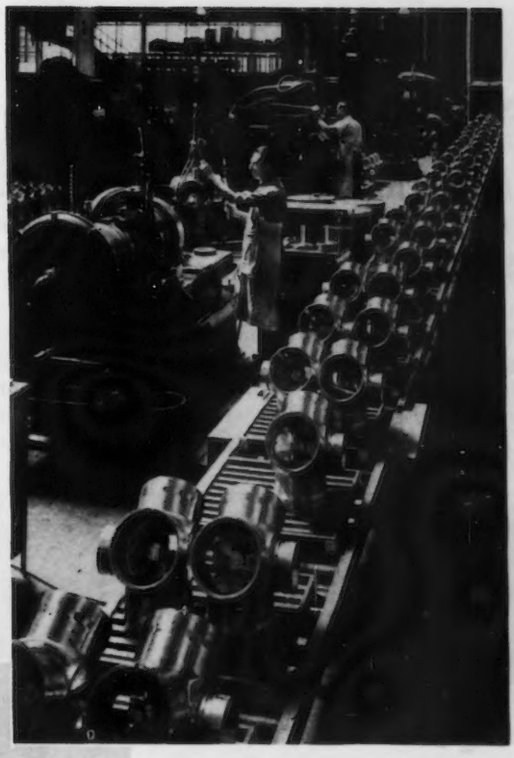
Army Clamps Down On Government Award List

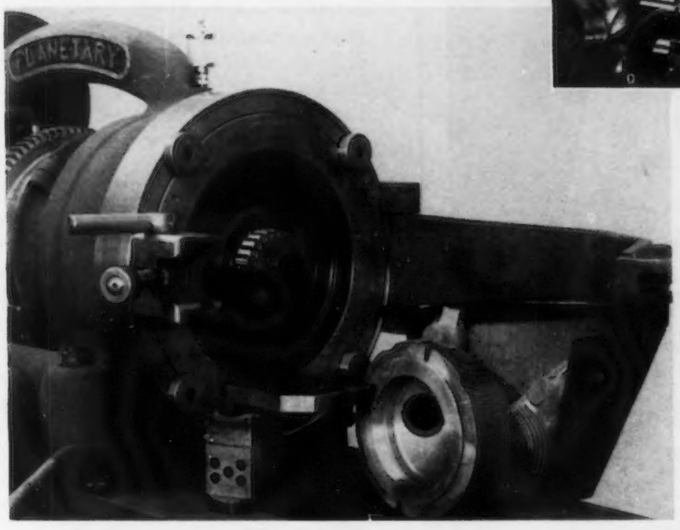
• • • The War Department has announced that it would no longer make public its list of Government Awards. In adopting its policy of censorship on awards, the War Department was following a procedure initiated the first week in June by the Navy, which at that time discontinued publication of Navy orders placed with individual contractors.

The Navy's censorship followed the President's June declaration of unlimited national emergency. The next week the Labor Division of the OPM decided to withhold figures on employment totals in explosives, ammunition and firearms industries, and the Department of Commerce discontinued releasing detailed statistics concerning the destination of our exports and the countries of origin of imports.

Other Government statistics continued to be released to the public until last week, when the Department of Commerce entirely discontinued release of import and export figures, and the Government Award list was withheld.

Now... they MILL THREADS *for Accuracy*





ABOVE—*Hubs for Curtiss Electric Propellers coming down the line. Operator is loading a hub into a Hall Planetary for milling the threads with Detroit thread milling cutters.*

LEFT—*Cylinder heads for radial aircraft engine being milled with a Detroit Tap cutter which also forms the I.D. of the head above the threads at the same time.*

IT WAS ONCE thought that for maximum precision, threads had to be ground. Today you can produce super accurate threads by milling. It is being done every day in the aircraft industry.

For instance, you will find that the close tolerance modified buttress threads in propeller blades and hubs, the threads by which cylinder heads screw into barrels, etc., are now produced to finished specifications, in one operation, with "*Detroit*" precision ground thread milling cutters.

The reason is simple. "*Detroit*" thread milling cutters are precision ground to tolerances closer than the most accurate of production thread requirements.

That's how all *Detroit Tap* products are made, whether they be milling cutters or hobs, standard or special taps, plug or ring type thread gages. Every one is precision ground of special wear-resisting alloys, precision-ground on machines developed for that purpose, and that purpose only.

Detroit Tap products are not built to a price. They are built to cut thread-production cost and thread-production time. Their low cost is a matter largely of quality-in-quantity . . . quantity demands which have quintupled *Detroit Tap's* plant capacity in the past year alone.

May we send you a catalog? You may be surprised how little 'Detroit' precision costs.

DETROIT TAP & TOOL Company 8432 BUTLER DETROIT

Washington Lineup for War

(CONCLUDED FROM PAGE 65)

the Iron and Steel branch in the OPM Materials Division, while C. Clay Crawford is the specialist in priorities for aircraft in the OPM and L. K. Vry is priorities specialist for tools in the Division of Production. There are many others.

(A complete list of members of the OPM Priorities Specialists staff, which gives assistance on specific commodity problems, appears in the 12-page Iron Age Allocations and Priorities Guide.)

To facilitate direct contact between defense officials and private industry, defense industry advisory committees and subcommittees have been appointed by OPM. These committees, which have 139 members for the steel industry alone, do not make decisions or transmit OPM orders to industry under the present setup but do advise and inform OPM representatives on matters pertaining to their industries.

Importance of the various divisions of the OPM varies from time to time as conditions change. With the urgent need for swelling defense goods production, following entry of the U. S. into active war, the OPM Division of Contract Distribution is becoming an active spot in the defense program picture.

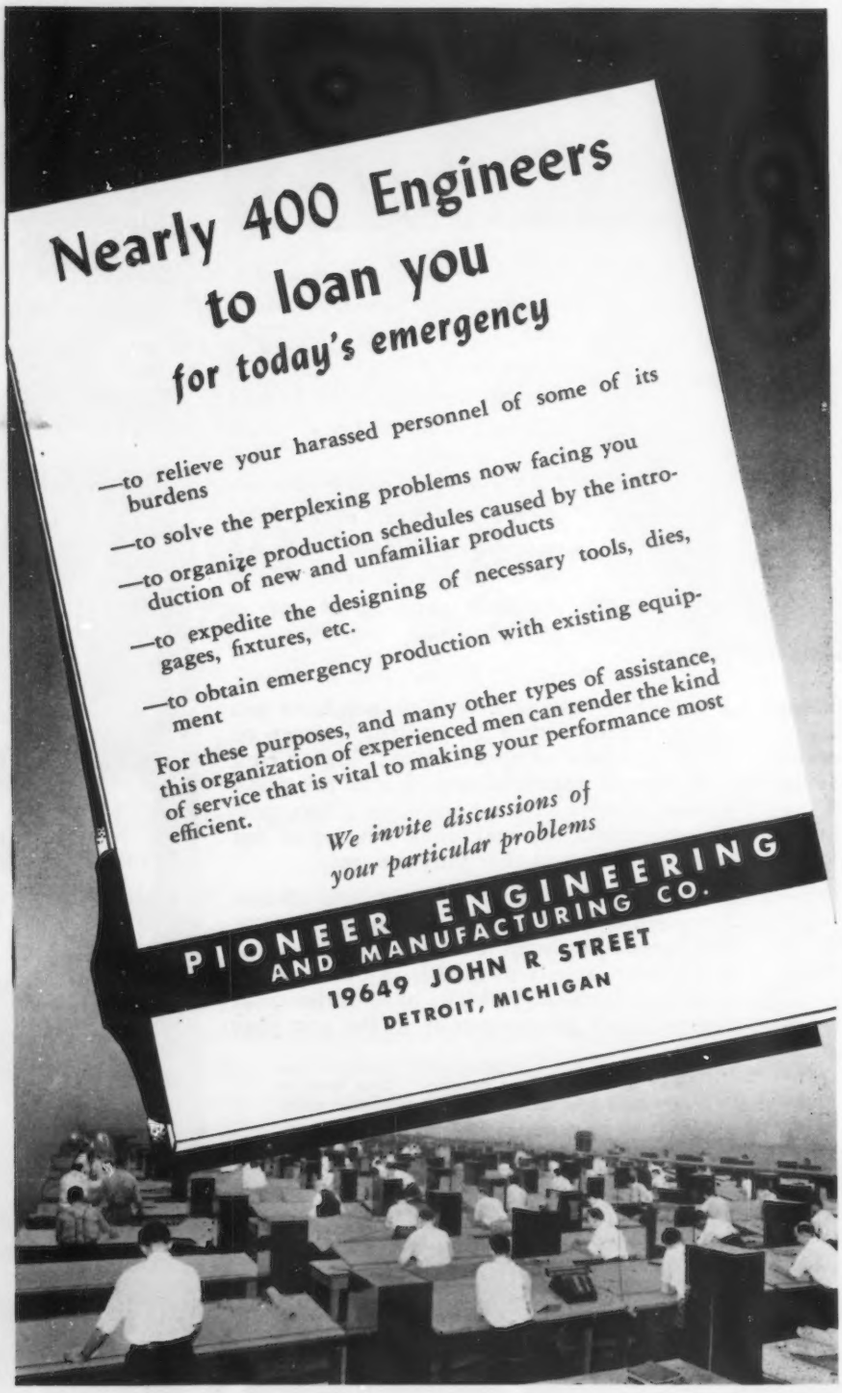
OFFICE OF PRICE ADMINISTRATION—Created by an executive order on April 11, 1941, this agency on Aug. 28, lost its Civilian Supply Division to the OPM but the task remaining is one of the most difficult of all problems arising from the war. Administrator Henderson has two basic duties—the prevention of inflation and the protection of consumer interests. He issues price schedules establishing maximum prices which may be charged for specific commodities, warns against price movements considered unjustified and takes other steps designed to hold prices within reasonable bounds.

(Full details on maximum prices established on principal materials and products in the metal industries appear elsewhere in this issue of THE IRON AGE.)

The OPA administrator, assisted by a deputy, John E. Hamm, is advised by a Price Administration Committee consisting of himself as chairman, the Secretary of the Treasury, Secretary of Agriculture, the OPM director general and associate director general and other government officials.

Whether the principal defense agencies, in their present forms, have enough power to do the job was only half answered at the beginning of 1942. Whether they can solve the problem of properly distributing materials to war plants to bring about a maximum production of weapons, while keeping life in non-defense plants starved for materials, at the end of 1941, had not been fully demonstrated.

On Jan. 1, 1942, it was clear that danger of a magnitude not faced by this country in generations was hardening U. S. industry, employees and government leaders into a unity which would flatten out many of the problems of arming an unprepared democracy and win the war.


Nearly 400 Engineers
to loan you
for today's emergency
—to relieve your harassed personnel of some of its burdens
—to solve the perplexing problems now facing you
—to organize production schedules caused by the introduction of new and unfamiliar products
—to expedite the designing of necessary tools, dies, gages, fixtures, etc.
—to obtain emergency production with existing equipment
For these purposes, and many other types of assistance, this organization of experienced men can render the kind of service that is vital to making your performance most efficient.
We invite discussions of your particular problems
PIONEER ENGINEERING AND MANUFACTURING CO.
19649 JOHN R STREET
DETROIT, MICHIGAN

SAVE TIME

Stock clerk, tool maker, heat treater, all along the line, your men can tell the grade at a glance. New men learn quickly. In countries where English is not spoken, KOLORKOTE is of particular value, since COLOR IS UNIVERSAL.

SAVE SPACE

Various grades can be racked together because the color identifies the smallest piece. Inventory is greatly simplified.

SAVE ERRORS

Instructions for heat treating are delivered with the steel. Complete instructions are enclosed in the red envelope attached to each shipment, and the heat treater always knows what steel he is working by the color.

SAVE DELAYS

Through our excellent connections and our experience gained in serving customers during previous emergencies like the present, we are still maintaining very adequate stocks of standard tool steels in our warehouses. If the grade you need is not immediately available, we can often get it to you much sooner than you expect.

G.H.Q.

FOR TOOL STEELS

and Ready for Action!

If your production is deadlocked with a Tool Steel supply problem, why not call on Milne for the reinforcements that will put a big "V" in your Victory effort.

A. Milne & Co. has been "G.H.Q for Tool Steels" in more than one war, and has learned well how to give customers the help they need. We can help you by getting steel to you faster. We can also help you by telling you what steels will best replace unavailable English, Swedish, and other Tool Steels . . . what to use in place of hard-to-get Tungsten Alloyed grades.

Send us your next inquiry and let us show you how quickly we can work out the answer to your Tool Steel supply problem. Write or phone the Milne office nearest you.

Milne Tool Steels are

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identified. Bright lacquer colors cover the entire surface, for the full length of the bar. Heat treating instructions are delivered with the steel. The advantages of these two unique features of Milne service are described at the left.

KOLORKOTE TOOL STEELS

MINING DRILL STEEL SPECIAL PURPOSE STEELS

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BOSTON	NEW YORK	CHICAGO
109 Broad St.	741 Washington St.	17 N. May St.

All United States offices connected by Bell System Teletype

PHILADELPHIA	PITTSBURGH	WASHINGTON, D. C.	DULUTH
Bourse Bldg.	604 Frick Bldg.	635 F Street, N.W.	2022 Woodland Ave.

Price Ceilings

(CONTINUED FROM PAGE 158)

sections of the country, shall be the maximum prices to be charged in areas served by each such distributer.

(F) Tool Steel

Notwithstanding the provisions of any other section of this schedule, the maximum delivered price for tool steel shall be the prices listed in the published price list of Crucible Steel Co. of America effective on April 16, 1941. The locations of warehouses of the Crucible Steel Co. of America are set forth in Table II.

Carload Quantities

Prices in excess of the mill prices provided under Price Schedule No. 6 shall not be charged by any person for: Direct shipments from producers or converters of any quantity of iron or steel products; or shipments of any quantity diverted from delivery to warehouses; or shipments of any quantity not put through the operations of warehousing.

Notwithstanding the provisions of any other section of this schedule, shipments of mixed carloads of 40,000 lb. or more out of warehouse stock, which shipments are made up of a variety of iron and steel items (such as plates, shapes, bars, sheets, special or otherwise, strip; carbon alloy and stainless) of different types, cross-sections, qualities, or classes, shall not be sold at a price in excess of the maximum delivered price for a 500 lb. quantity, minus a discount of not less than $7 per net ton.

Mixed carloads of merchant wire products shall be sold at maximum prices not exceeding the published mill base prices established under Price Schedule 6. (Regular jobber allowances given by mills may be retained by seller of such mixed carload.)

Mixed or straight carloads of 40,000 lb. or more of pipe and tubular products, including boiler and other pressure tubes and mechanical tubing, shall be sold at maximum delivered prices not to exceed published mill carload prices of such products established by Price Schedule 6; except that the above provision shall not apply to sales of oil country tubular goods out of distributer's stocks, but shall apply to direct mill shipment.

Notwithstanding the provisions of any other section of this schedule, on shipments of 40,000 lb. or more out of seller's stock not falling within paragraph above, the maximum delivered price shall be the mill price as established under Price Schedule No. 6. Except that on presentation to OPA of a certificate that such shipment out of seller's stock has been specifically authorized by the Office of Production Management, a maximum delivered price will be established by OPA.

Notwithstanding the provisions of any other section of this schedule, in the case of any shipment of any quantity out of a warehouse stock which has been specifically allocated to the warehouse by the Office of Production Management, and has been there held for reshipment for use in defense repairs or other defense purposes, the maximum delivered price shall be fixed by the OPA upon application for the setting of such maximum delivered price, which application shall contain a sworn statement setting forth the source of such iron or steel products, the Office of Production Management rating or certificate, and the destination to which OPM has directed that shipment be made.

Records on any sales of 40,000 lb. or more of any iron or steel products to any single customer in any calendar month shall be filled with OPA on or before the 15th day of the next succeeding month. This filing shall

when SMOOTHNESS and PRECISION
are vital
Strom
BALLS
Can be depended upon. Many manufacturers of bearings for high speed precision machine tools have used Strom Steel Balls continuously and exclusively for many years • • Uniform and dependable physical quality assures maximum resistance to fatigue • • Inherent smoothness and sphericity, coupled with extreme precision in diameter, contribute to quiet bearing performance at all speeds • • Remember—Ball Bearings of domestic manufacture are currently superior to anything heretofore available in this field of industry • • Strom Balls are also available in Stainless Steel, Monel Metal, Brass and Bronze—Catalogue gladly furnished upon request.
Strom Steel Ball Co.
1850 SO. 54TH AVE., CICERO, ILL.
The largest independent and exclusive Metal Ball Manufacturer

include a sworn statement of the names and addresses of the buyers, the products and quantities sold, and the price for each quantity.

Seconds, Wasters, Etc.

Maximum delivered price for all off-grade, seconds, wasters and used iron or steel products, after such shearing, cutting, straightening, bending or pickling, as may be necessary, shall not exceed the maximum delivered price for comparable iron or steel products of prime quality.

General

Delivery and other services of all kinds, credit or other discounts, all freight absorptions (except as otherwise specified in this schedule), all allowances, and all other privileges in effect on April 16, 1941, shall be continued without diminution or extra charge. Brokers, agents, consignees, distributers without stocks, and other persons acting in sales transactions on behalf of owners of iron or steel products other than producers, may continue to charge their customary commissions in effect on April 16, 1941. Except that in such cases where commissions are to be added to the selling price, the result shall not exceed the maximum delivered price as established by this schedule.

TABLE I

Iron and Steel products, including alloy, covered by this price schedule.

Ingots, blooms, billets, slabs, sheet bars, skelp, tube rounds, muck bar, forging rounds.

Bars and small shapes, new billet and rail steel: Merchant, cold finished—carbon, concrete reinforcing, alloy-hot rolled, cold finished, hoops and baling bands. Tool steel bars (rolled and forged), all plates, sheared and universal, armor plate—forged, cast, rolled and otherwise, shapes including bearing piles and sheet piling and accessories.

Rails: Standard (over 60 lb.), light (under 60 lb.), all other (including girder, and guard). Track materials including: tie plates, tie rods, track spikes—regular cut and screw, splice bars (joint bars, angle bars, rail joints, and fish plates), track bolts, nuts, and ties.

Axles, car wheels, or any combination, rolled or forged, pipe and tube—plain, threaded and coupled (including conduit spiral welded pipe, and mechanical tubing); butt-weld, lap-weld, electric-weld, gas-weld, seamless and hammerweld. Black plate, tin plate (hot rolled, cold reduced), sheets and strip (including plain and corrugated, and roofing and siding of all types as hot rolled, cold rolled, galvanized, ternes, enameling, electrical, and all other.

Wire rods, wire—drawn (includes manufacturer's and merchant), wire belting, bale ties and buckle wire, wire nails, staples, tacks, twisted barbless and barbed wire, woven wire fencing, chain link fencing, poultry and animal farm netting, woven wire cloth—insect, hardware and all other, wire rope, wire strand, and special cords such as aircraft, wire clothes line, twisted and solid, wire hoops—twisted or welded, communications and power transmission wire, welded or woven wire fabric for reinforcing, and posts—fence, sign and all other.

TABLE II

Listed cities or free delivery areas in which sellers stock heavy steel line and merchant wire products.

Baltimore, Scully Steel Products.

Birmingham, Southern Steel Co., Moore-Handley Co.[1]

Boston, Jos. T. Ryerson & Son, Scully Steel Products, Wheeling Corrugating Co.,[1] Wheelock-Lovejoy & Co.

Buffalo, Jos. T. Ryerson & Son,

● Long Lift Electric Hoist, remote operated, handling rolls of stainless steel.

"Hoists for Every Load-lifting and Load-moving Need", aptly describes this 48-page Catalog No. 127. Send for your copy today.

● Shepard Niles Liftabout Electric Hoists are operating 24 hours a day, in hundreds of mills and factories. A tough schedule for any piece of machinery, but reports from our customers show that the Liftabout asks for no time-off and time-out. Fortified with such outstanding features as, "Balanced Drive" heat treated gearing, automatic oil bath lubrication and sealed enclosures for all vital parts, they are always on the job.

SHEPARD NILES
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A COMPLETE LINE OF CRANES & HOISTS

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Houston, Earle M. Jorgensen Co., F. W. Heitmann & Co.

Indianapolis, W. J. Holliday Co.

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Memphis, Jones & Laughlin Steel Corp.

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New York, Jos. T. Ryerson & Son, Scully Steel Products, Jones & Laughlin Steel Corp., Wheelock-Lovejoy & Co.

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Philadelphia, Jos. T. Ryerson & Son, Wheeling Corrugating Co.[1]

Pittsburgh, Scully Steel Products, Jones & Laughlin Steel Corp., C. A. Turner Co.[1]

St. Louis, Jos. T. Ryerson & Son, Scully Steel Products, Wheelock-Lovejoy & Co.

St. Paul, Scully Steel Products.

San Francisco, A. M. Castle & Co., Earle M. Jorgensen Co.

Seattle, A. M. Castle & Co.

[1]The prices of these firms are published list prices only as to the merchant wire product line.

Listed cities or free delivery areas in which Crucible Steel Co. warehouse stocks of tool steel are located.

Atlanta, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Denver, Detroit, Indianapolis, Los Angeles, Milwaukee, Newark, New York, Philadelphia, Providence, St. Louis, San Francisco, Seattle, Springfield, Mass.

Listed cities or free delivery areas in which National Tube Co.'s exclusive distributers of mechanical tubing are located.

Cambridge, Austin-Hastings Co.

Los Angeles, Ducommun Metals & Supply Co.

New York, Buffalo, Philadelphia, Peter A. Frasse & Co., Inc.

Cincinnati, E. K. Morris & Co., Inc.

Chicago, Detroit, Indianapolis, St. Louis, C. A. Roberts Co.

Cleveland, Strong, Carlisle & Hammond.

Atlanta, J. M. Tull Metal Supply Co.

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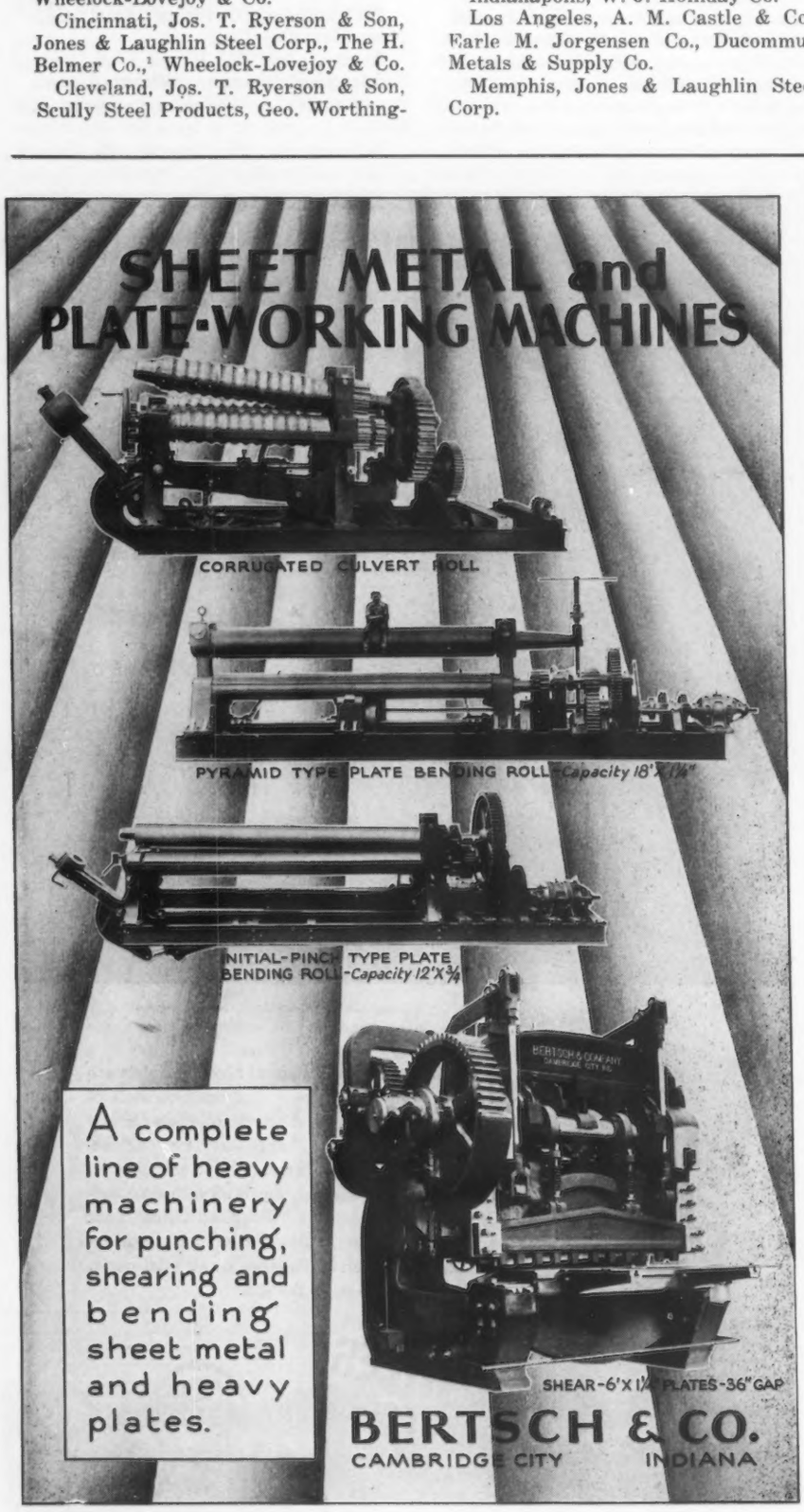
Miscellaneous

Any resale agent who sells 40,000 lb. or more of any wire or steel products to a single customer in any calendar month must file with OPA, on or before the 15th of the following month a complete record of the transaction, including product, price, quantity and names and addresses. All persons making sales of purchases of resale products after Dec. 15, must keep records for a period of not less than one year for inspection by OPA. In addition to data on sales, resale agents must also keep a record on tonnage of products on hand and on order in a manner similar to that of OPM Form PD-83.

Persons claiming of hardship or inequity under the terms of this schedule may apply to OPA for modification or exception. Such a complaint must be submitted in a letter entitled "Application for Relief from Price Schedule No. 49, Resale Prices of Iron and Steel Products." This letter should be mailed separately from any other forms which may be filed with OPA.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A complete line of heavy machinery for punching, shearing and bending sheet metal and heavy plates.
BERTSCH & CO.
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Non-Ferrous Metals at War

(CONTINUED FROM PAGE 120)

year's supply on hand, and refined tin has not yet been placed under an allocation order by OPM. That tin users have comfortable supplies on hand was evidenced by the fact that, when MRC offered to sell from the government stockpile because importers were forced out of Far Eastern markets because of price, only a few hundred tons were requisitioned. Private inventories are estimated in excess of 100,000 long tons.

Indirect military requirements next year will require about 50,000 tons, but the 40,000 ton MRC stock and 100,000 ton private stock should be sufficient for 1942 demands.

On Dec. 18, OPM issued an order freezing all supplies of tin in the United States or on the way here, and forbid all sales or deliveries of tin without specific permission of Donald M. Nelson, director of priorities, and announced a conservation program would be issued in a few days. The order provided that all tin in the United States or afloat would be subject to specific allocation by the priorities division. No tin may be sold or delivered under the order without permission, except that a distributer may deliver to his regular customers in less than five-ton lots if they do not have ample stocks on hand.

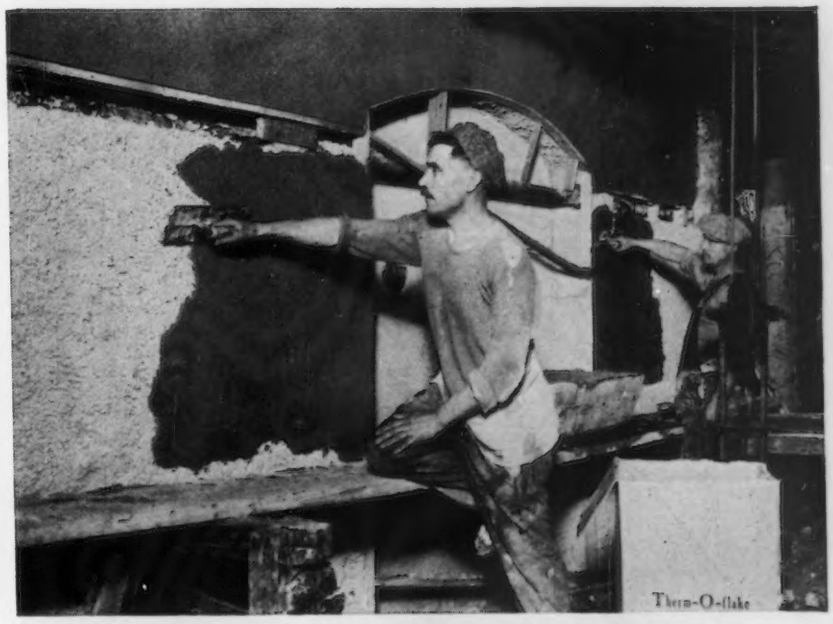
The order further stipulated that all future tin imports must be sold to the Metals Reserve Co., unless permission is granted for sale to a private consumer. Private inventories now in United States in all probability will be allocated by OPM, or the use of them will be definitely limited to the production of vital defense goods.

Nickel

NICKEL, for the past 10 months, has been in an uncomfortable position insofar as the supply situation is concerned. At the present time, about 60 per cent of the available nickel is being used in direct war work, 10 to 15 per cent for borderline military work, and the remaining supply for non-military needs. This supply for non-essentials is estimated at about 20 per cent of the requirements.

The chief use of nickel in the war program is in the manufacture of alloy steel, which requires upward of 63 per cent of the available supply at present, and will require more and more as the electric furnace capacity expansion now under construction is completed. Furthermore, in addition to requiring a regular operating supply, these furnaces will need a considerable inventory to maintain continuity of operations.

It was reported by the International Nickel Co., supplier of more than 90 per cent of the nickel coming into United States that steel mill operations, including the manufacture of alloy steels, consume about 70 per cent of the refined nickel imported into this country. Of the remainder, foundries are taking 7.3 per cent; brass mills, 6.5 per cent; heat resisting and electrical resistance alloy manufacturers, 4.6 per cent; electroplaters, 2.5



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per cent, and the remainder is required for rolled nickel and high nickel alloys, as well as a variety of other products that require some nickel in their manufacture.

Supplies:

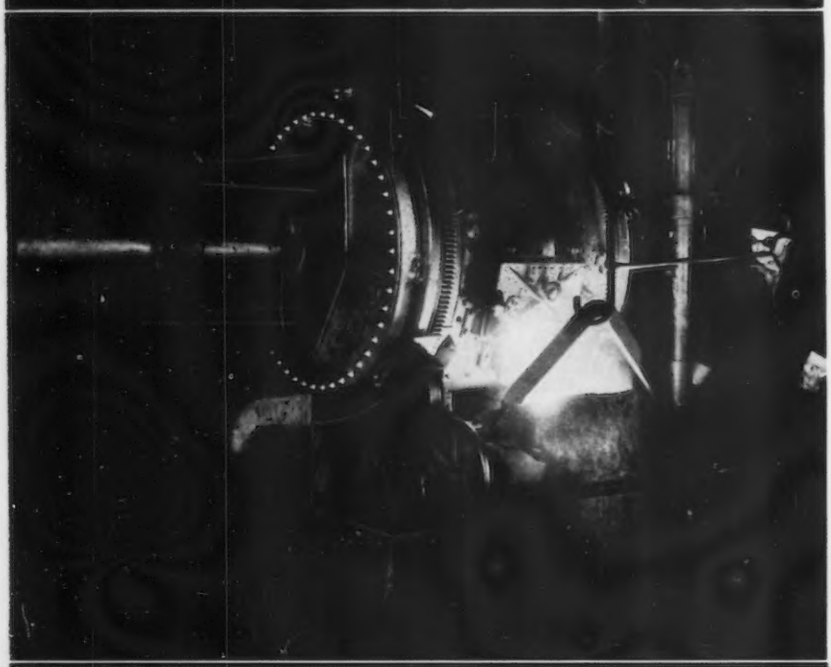
Supplies of nickel to the United States are reported at 7500 tons a month, but the demand is currently running close to 10,000 tons a month. The United States consumed more than two-thirds of the world's total production of nickel in 1941, as contrasted with an average annual consumption of about one-third of the production in recent years. Of the imported nickel, about 90 per cent comes from Canada, while another 5 per cent is received from New Caledonia. In addition to the 1941 imports, estimated at 90,000 tons, another 3000 ton was obtained from secondary sources, making the total supply about 93,000 tons, compared to 70,000 tons consumed in United States in 1940. Available supplies of nickel in 1942, not including that recovered from scrap, have been set at 110,000 tons.

Nickel prices in United States and Canada were unchanged during 1941, at figures prevailing for more than 15 years, 35c. a lb., f.o.b., refinery or mill.

Conservation of nickel has been the theme of the United States government since the beginning of the war, so as to insure adequate supplies to war industries. According to present estimates, more than 90 per cent of the now available nickel is being used to fill high priority war orders. Nickel was placed under mandatory priority control in this country in May.

In a recent statement by Robert C. Stanley, president of the International Nickel Co., it was indicated that all mines and smelters of the company's Canadian holdings operated at capacity throughout 1941, and the production rate has been raised 25,000 tons a year over the 1940 rate. Further expansion of production has been undertaken at a cost of $35,000,000, and will be completed in 1943.

Speeding up Production for World War II



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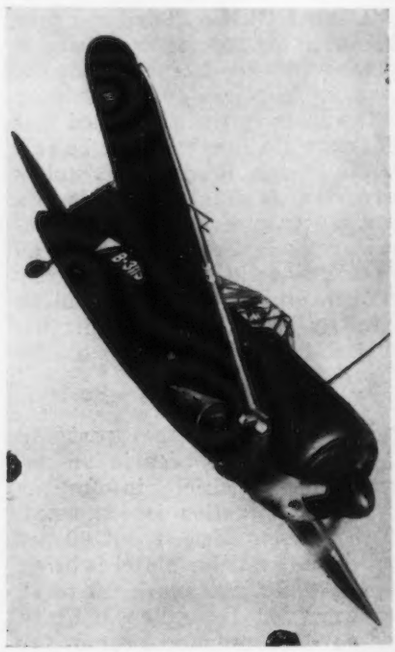

PLANES FOR THE DUTCH: One of a large fleet of Brewster Buffalo fighters being used by the Netherlands East Indies' air force for the defense of Java. It is armed with four 50-caliber machine guns and has a top speed of 350 m.p.h.

Machine Tools Behind the War

(CONTINUED FROM PAGE 101)

builders did not look upon such lump orders as firm orders was that they still had to find an individual customer for each tool on the pool order, since the aircraft subcontractor could still place his orders at his own discretion. And what is more, when the machine tool builder received an order from such a subcontractor, he did not necessarily charge it against his pool order. At least, not many have done so to date. In the first place, there was considerable confusion, resulting from conflicting instructions, as to just how such pool orders were to be handled, and considerable red tape was involved in having such machines "canceled" from the list. Secondly, the pool order is a protective device to the machine tool builder, and he certainly does need one, considering the present overexpansion of the industry away beyond normal peacetime needs and the huge amount of capital tied up in work in process inventories. It protects the builder in that, should the whole armament program suddenly cease, he will be reimbursed in full for any machines specified on the pool that are on hand or can be completed within 30 days, and will be paid labor and material costs plus 12 per cent for any other work in process. What some machine tool builders would like to see is a protective device of this kind extended to the form of a general moving backlog, amounting to three to six months' productive capacity. The purpose would be to save the industry from complete wreckage following the end of the war effort.

The other reason why some builders do not look upon pool orders as firm orders is that, statistically, they might be recorded twice—once in the pool and then again as a confirming order from a subcontractor. If reported when received, the pool order would distort the sales of one month out of all proportion to reality. All of which is leading up to the statement that there is no such thing today as anything like an accurate picture of the present order backlog of the industry. In general, it can be said that the industry as a whole has an average of seven months' business ahead, with the longest deliveries planned for 17 or 18 months ahead.

This picture is not static, however, particularly since output is steadily climbing as new facilities come into play. Planned additions to capacity will extend through the first quarter of this year. There has been a steady rise in plant efficiency as green workers become more proficient, and the actual entry of the United States into the war in December produced a noticeable uplift in worker morale, resulting in more pronounced "all-out" effort and increase in output. This one factor alone may result in a 10 per cent increase in productive effort without adding a single square foot of floor space or put-

(CONTINUED ON NEXT PAGE)

ting in one additional machine tool. With the expanded war effort, such gains will be all to the good.

Deliveries still vary widely, of course. Big machine tools — and they are the critical ones—will always take a long time to build, since they are invariably especially engineered and literally "hand built." High grade machines made by the best known plants are in greater demand than the secondary lines, particularly those made by companies who are newcomers to the field. As the emergency deepens, a better balance will be struck because it will be preferable to obtain a cheaper tool on a short delivery than to wait twice as long for the top-notch product. For priorities still determine only the order of shipment, and do not necessarily involve the constant deferment of low priority ratings.

Priorities

The machine tool industry was the first group to work under a priority set-up, at first on a voluntary basis (August, 1940) and then on a mandatory basis (Feb. 24, 1941). It has been the proving ground of priority control, and hence has been subjected to frequent changes. It worked under A-1, A-2, A-3, etc., priorities for a few months until everybody was getting an A-1 rating, or so it seemed. It was then that A-1 was broken down by the Army and Navy Munitions Board into eight parts, A-1-a, A-1-b . . . A-1-j. This scheme of subdivision worked well for a while and was adopted in toto by the Priorities Division of OPM when machine tool priorities became mandatory last February. Soon things were out of balance again, however, not so much because the system was at fault as because the demands of the then "defense program" kept changing as our armed services benefited by the experiences of the fighting forces in Europe and in northern Africa.

The change in ideas as to armament of fighter planes is a typical example of how the requirements of the program kept changing. A couple of years ago American pursuit ships were being equipped with two machine guns; by late 1940 the number had been increased to four, and before many months had passed, to six. Meanwhile the need for an aircraft cannon firing an explosive projectile became apparent, and by mid-year Bell Airacobras were going out with a 37-mm. cannon in the nose. Before long, however, the British were telling us of the effectiveness of a much lighter weapon, firing a 20-mm. shell. Simultaneously, the 37-mm. gun was being developed as both a tank and anti-tank weapon. These changes in military ideas kept adding to the amount of productive plant and hence machine tools required to make these weapons and complicated the problem of priorities, which were devised primarily to see that "first things came first."

To solve this difficulty, the deck of priority ratings was reshuffled on July 7, 1941, by order of Edward R. Stettinius, Jr., then direc-

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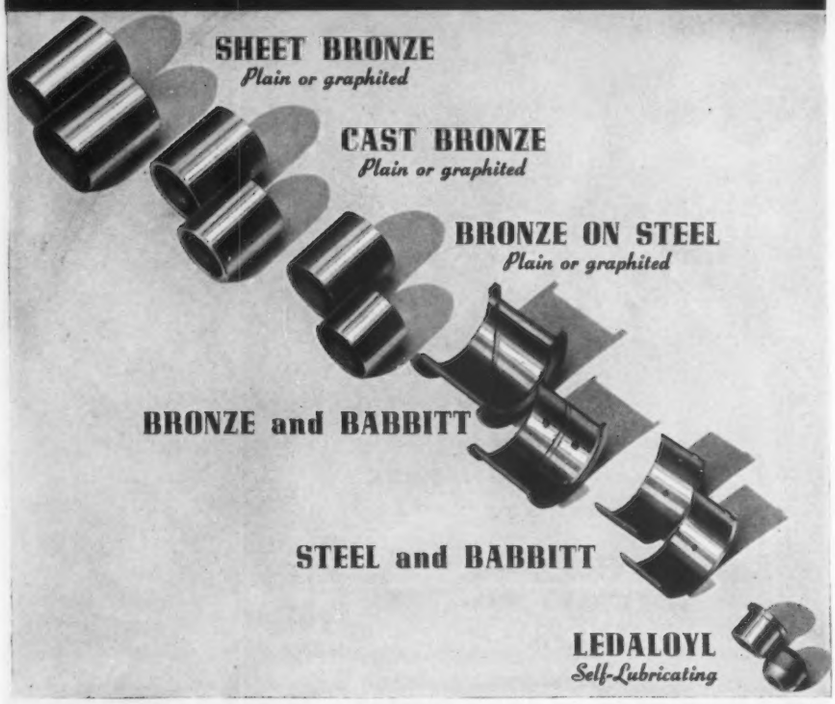

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tor of priorities of OPM. The new order set up a master-preference rating system in which was incorporated an urgency rating list, naming plant by plant the order of preference of defense contractors bearing the same ratings. The list was later revised on Aug. 21 and at that time contained a list of 212 contractors with an A-1-a rating, 313 with a A-1-b rating and 92 with an A-1-c. British lend-lease orders were given an A-1-c rating, and were left undisturbed as to original shipping schedule. As might be assumed from what was said above, aircraft armament was given a higher standing on the list than aircraft itself, including the new bomber program. For at that time plane productive capacity was ahead of, and hence out of step with, the production of aircraft armament. During the week of Dec. 8, the list of urgency standings was again revised in the light of full war conditions.

Machine tool builders have been getting a blanket A-1-a priority on all their purchases of materials, parts and machinery. After the urgency rating list was set up, however, the blanket rating for the industry was dropped, as far as acquisition of new machinery is concerned. (There are no machine tool builders on the urgency list.) Instead, builders now have to obtain a project rating for each new plant facility program contemplated. Obviously, many of these projects continue to receive A-1-a ratings, for it still takes machine tools to make machine tools.

Export Trends

It will be noted from Chart 3 and the accompanying table that monthly exports of machine tools since the war began in September, 1939, reached their peak in October, 1940, and thereafter showed a decline to a low point in July, 1941. August dollar volume showed a sharp gain, but September marked a drop to the level of the May volume. Taking all factors into account, it is inevitable that the long term trend should continue downward, even though slight gains may be recorded in months immediately subsequent to September, the last month for which official figures were available from the Department of Commerce at the time this article was written (middle of December).

Shortly before the United States became involved in the war, OPM sent a machine tool expert to Great Britain to survey machine tool requirements. The recommendation he brought back was that no further American machine tools need be sent to Britain. While his recommendation was not accepted in toto, it is understood that further shipments of machine tools to England will be cut in half, although the flow of machine tools to the Dominions, such as Canada and Australia, will not be disturbed. Apparently, this decision was made not to impede the British war effort, but rather to bolster the overall productive effort of the embattled democracies. For in the long run, it is not machine tools that the British are looking for, but

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the product of machine tools—aircraft, ships, guns and ammunition. It is much more sensible to build up the productive capacity of America because, compared to Britain, it is still relatively much less vulnerable to air attack upon its war industries.

Another factor that should not be overlooked is the immense amount of time-consuming but necessary procedure in handling lend-lease orders. Aside from the Lend-Lease Administration and the British Purchasing Commission, the tools section of OPM, the Army & Navy Munitions Board, the Treasury and the local district ordnance offices—all have to give approval to each contemplated order, after due investigation and weighing of all the factors involved. This procedure tended to slow up the whole buying or requisitioning function and, in fact, introduced a time lag of several months, as the drop in exports during the summer of 1941 clearly shows. For it must be remembered that although the Lend-Lease Act was signed on March 11, the enabling legislation appropriating the necessary funds was not passed until later in the month, and it was July before shipments under lend-lease were actually made, according to Lend-Lease Administration, itself. The rebound of August shipments over July reflect the transition largely to lend-lease shipments.

Japan did not cease to be a factor in the U. S. export market for machine tools until the beginning of 1941, although the trade treaty with that country had been abrogated a full year before. Even after restrictions had been placed on exports of machine tools to Japan, for several months some unimportant types of machine tools were granted export licenses. Substantial quantities of American machines were shipped to the Nipponese during the years including 1937 through 1940, the record year being 1939, when almost $20,000,000 worth of tools were exported. Before 1937, shipments to Japan averaged $2-$3,000,000 worth a year.

In view of the events of the last month, most machine tool men regret this past business, which helped build up the Japanese war machine, but like American scrap exporters, they felt that the issues involved could not be handled by the industry itself, but only by the Administration and the Department of State.

Machine tool exports were made subject to licensing control by the State Department in July, 1940, and although many critical tools vital to our then defense program were withheld from shipment abroad, shipments continued to both Japan and Russia, but in diminishing volume. Official figures are not available since February, 1941, but it would not be far off to assume that exports to Russia were running between one-fifth and one-tenth the 1940 volume. With the switch of Russia from an ally of Germany to the only European power that has successfully withstood Hitler's blitzkrieg tactics, it was to be expected that shipments of machine

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tools would again be given the green light to Russia. This moment came in November when under Special Allocation Order No. 1, 35 machine tool builders were instructed to accept specified orders placed on behalf of the U.S.S.R. by its agent, the Amtorg Trading Corp. About $10-$15,000,000 worth of tools were covered by the order and shipments were to extend over the next 12 months.

Cutter Situation

In closing, a word should be said about the cutter situation as it relates to machine tool availability. A tightness in the supply of high speed steel, particularly in the high cobalt variety, was noted in the early part of the year. By early June, OPM had limited the high tungsten types to half the requirements of any manufacturer, the remainder to be made up of molybdenum high speed steels; by December when the supply of tungsten coming in from China over the Burma Road was definitely threatened, 14 to 18 per cent tungsten grades were limited to 25 per cent of actual requirements. The shortage of material was only part of the picture, the other side being the normal capacity of the small tool and cutter manufacturers throughout the country. Before midyear it was being predicted that because of unprecedented new demands, even the aircraft engine manufacturers would soon have machine tools coming into their plants, but would not be able to run them for lack of vital cutting elements. This proved to be true before the year was out. Meanwhile OPM, foreseeing this new bottleneck, issued priority order E-2 in late July, giving preference on tool orders to holders of priority ratings of A-10 or higher and cutting out all non-defense product manufacturers. This order left automobile makers and other consumer goods manufacturers completely out in the cold. A few weeks later the cutters manufacturers were given an A-1-a priority on their supplies, same as the machine tool builders themselves enjoyed. The situation is still far from being solved and has been complicated as regards tungsten supply by the extension of the war in the Far East. The fact that many tungsten steels are used in such war items as bullet cores has also tended to aggravate the shortage.

On the other hand, the tightness in high speed steel has given great impetus to the adoption of cemented carbide tools. Production of these types of cutting tools has gone up by leaps and bounds in the past year, particularly the steel cutting grades. For, pound for pound, tungsten is 60 to 100 times more effective in the form of a small cutting tip than in a whole tool of high speed steel. Incidentally, during the last war, Germany was using high speed steel in the form of tip material. Even before this war started, Germany ruled out entirely the use of high speed steel for cutting tools. The United States will probably never go that far, but the stage is set for application of carbide tools on a huge scale.

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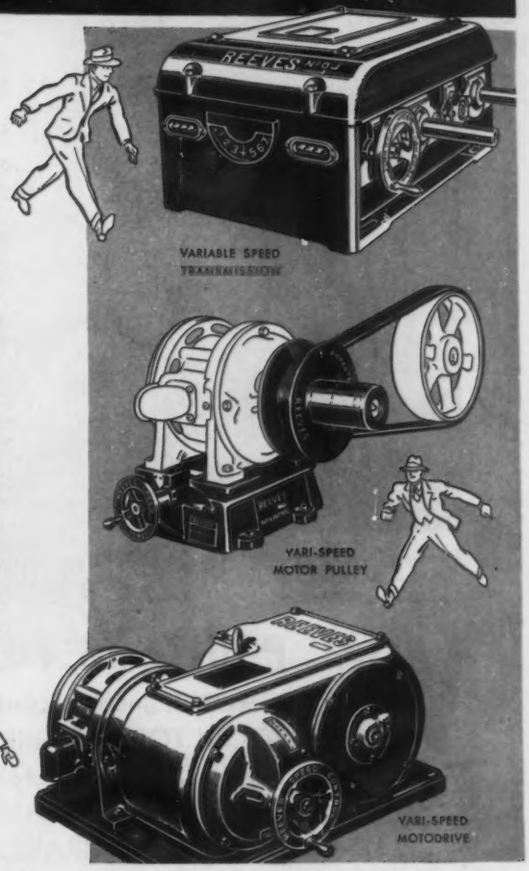
for getting more production out of the machines *you already have*



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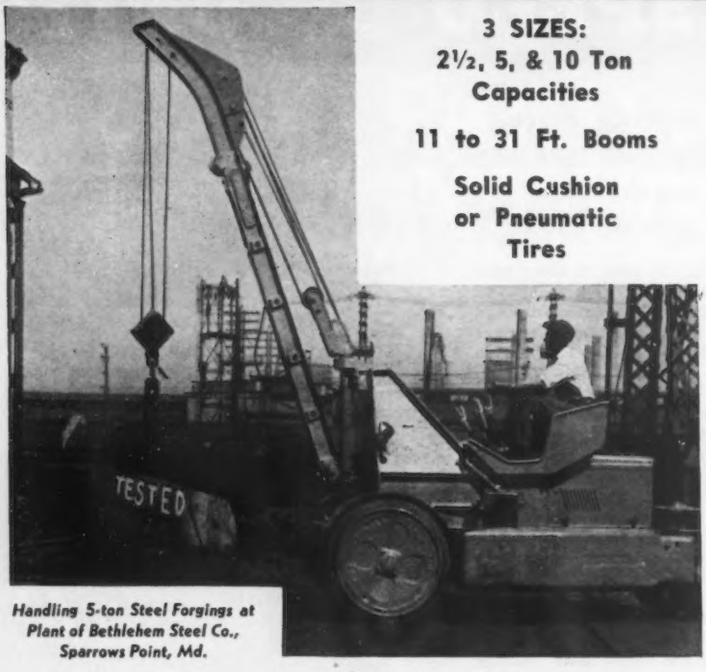
Machine tool builders.....$59,051,000
Small tool, cutter, jig, fixture, die and gage makers $13,331,000
Machine tool components, including castings $1,047,000
Grand total $73,429,000

KRANE KAR SWING BOOM TRACTOR CRANE



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Write for Bulletin No. 55, with illustrations and specifications

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Machine Tool Builders....$59,051,000

Acme Machine Tool Co., Cincinnati; metal working machinery.	$13,000
Ajax Mfg. Co., Inc., Cleveland; forging machinery	174,000
Charles G. Allen Co., Barre, Mass.; drilling and tapping machines..	121,000
American Broach & Machine Co., Ann Arbor, Mich.; broaching machine tools	100,000
American Screw Products Corp., Newark; screw machines	19,000
American Tool Works Co., Cincinnati; engine lathes and radial drills	933,000
Arter Grinding Machine Co., Worcester; rotary surface grinders	86,000
Avey Drilling Machine Co., Covington, Ky.; machine tools ...	23,000
Axelson Mfg. Co., Vernon, Cal.; engine lathes	241,000
Baker Brothers, Inc., Toledo; boring and drilling machines ..:...	155,000
Barnes Drill Co., Rockford, Ill.; drilling, tapping, boring machines	256,000
Bardons & Oliver, Inc., Cleveland; turret lathes	224,000
Baush Machine Tool Co., Springfield, Mass.; drilling, boring, and reaming machines	59,000
Charles H. Besly & Co., Chicago; disk grinding machines	55,000
Beatty Machine & Mfg. Co., Hammond, Ind.; hydraulic presses and plate work machines	26,000
Bilgran Gear & Machine Works, Philadelphia; machine tools ...	10,000
Blanchard Machine Co., Cambridge, Mass.; surface grinders	73,000
Bradford Machine Tool Co., Cincinnati; lathes and accessories..	106,000
Bryant Chucking Grinder Co., Springfield, Vt.; internal grinders	228,000
Buhr Machine Tool Co., Ann Arbor, Mich.; drilling and tapping equipment	61,000
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Carlton Machine Tool Co., Cincinnati; radial drills	39,000
Chambersburg Engineering Co., Chambersburg, Pa.; forging and pressing equipment	600,000
Cincinnati Bickford Tool Co., Cincinnati; machine tools	608,000
Cincinnati Milling Machine Co., Cincinnati; milling machines ...	10,406,000
Cincinnati Planer Co., Cincinnati; planers and boring mills	555,000
Cincinnati Shaper Co., Cincinnati; shapers, presses and brakes	263,000
Circular Tool Co., Inc., Providence; machine tools	39,000
Clearing Machine Corp., Chicago; mechanical and hydraulic presses	635,000
Cleveland Automatic Machine Co., Cleveland; automatic screw machines	274,000
Cleveland Hobbing Machine Co., Cleveland; shell - turning machines and hobbing machines ..	416,000
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DeVlieg Machine Co., Ferndale, Mich.; machine tools 184,000
East Dayton Tool & Die Co., Dayton, Ohio; machine tools 37,000
Edlund Machinery Co., Cortland, N. Y.; drilling machines 27,000
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Ex-Cell-O Corp., Detroit; aircraft engine parts 1,670,000
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Ferracute Machine Co., Bridgeton, N. J.; machine tools, etc. 170,000
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Fosdick Machine Tool Co., Cincinnati; radial upright and sensitive drills 135,000
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General Machinery Corporation, Hamilton, Ohio; machine tools.. 502,000
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Gleason Works, Rochester, N. Y.; machine tools 2,136,000
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Kearney & Trecker Corp., Milwaukee; milling machines 1,191,000
Kempsmith Machine Co., West Allis, Wis.; machine tools 89,000
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Landis Tool Co., Waynesboro, Pa.; grinding machines 631,000
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Murchey Machine & Tool Co., Detroit; machine tools 20,000
National Acme Co., Inc., Cleveland; machine tools, airplane brakes and wheels 374,000
National Automatic Tool Co., Richmond, Ind.; machine tools 57,000
National Broach & Machine Co., Detroit; gear shaving, lapping and measuring machines 189,000
National Tool Co., Cleveland; machine tools 68,000
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Snyder Tool & Engineering Co., Detroit; milling, drilling and grinding machinery 82,000
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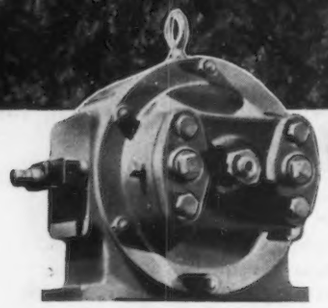

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CONTINUATION

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United Drill & Tool Corp., Chicago; drills, reamers and punches	324,000
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ITEM	Brass	Bronze	Copper	Everdur	Monel	Stainless
Cap Screws:						
Hexagon head	x	o		x	x	x
Flat head	x	x		o	o	o
Round head	x	x				
Fillister head	x	x		o	o	o
Special	o	o	o	o	o	o
Bolts:						
Machine	x	x		x	x	x
Carriage	x	x		x	x	x
Flat head	o	x		o	o	o
Round head	o	x		o		
Oval head		x				
Hangar		x		x		
Stove	x					
Special	o	o	o	o	o	o
Screws:						
Thumb	x					
Lag	x	x		x	x	x
Machine	x			x	x	x
Wood	x			x	x	x
Set	x	o		x	x	x
Knurled	x					
Special	o	o	o	o	o	o
Studs	x	x	o	x	x	x
Threaded Rod	x					
Nuts:						
Knurled	x					
Heavy American Standard	x	x	o	x	x	x
Light American Standard	x			x	x	x
Regular American Standard	x	x		x	x	x
Machine screw	x			x	x	x
Castellated	x				x	x
Wing	x			x	x	
Special	o	o	o	o	o	o
Cap	x				x	x
Washers:						
Regular	x		x	x	x	x
Lock				x	x	x
Counter sunk finishing	x					
Special	o	o	o	o	o	o
Cotter Pins	x				x	x
Rivets	x	o	x	x	x	x

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Scrap — OPA's Problem Child

(CONTINUED FROM PAGE 79)

of this country is not capable of handling the vast amount of this loose material. OPM plans are underway to encourage the installation of numerous briquetting machines. Tentative plans are to have the larger sources of such material do their own briquetting. The briquetting machines would be supplemented by a number of commercially operated units, located at strategic points, to take care of material from the smaller plants. The present aim apparently is to encourage scrap dealers to undertake the operation of such plants, but if this is not successful, it would not be surprising to have the government subsidize a number of briquetting plants.

Aside from the value of scrap as a basic raw material, the tremendous use of alloy steels in armament work and the curtailment of imports of such strategic alloying materials as nickel and chromium is giving alloy scrap a new value in terms of a source of these alloying materials, particularly nickel.

One authority on alloy steels has said that the gangways of some of the industrial plants of this country are richer in nickel than the mines of the International Nickel Co.

The obtaining of nickel supplies is an extremely important part of the present plan to expand electric furnace production. It may well become the restrictive factor.

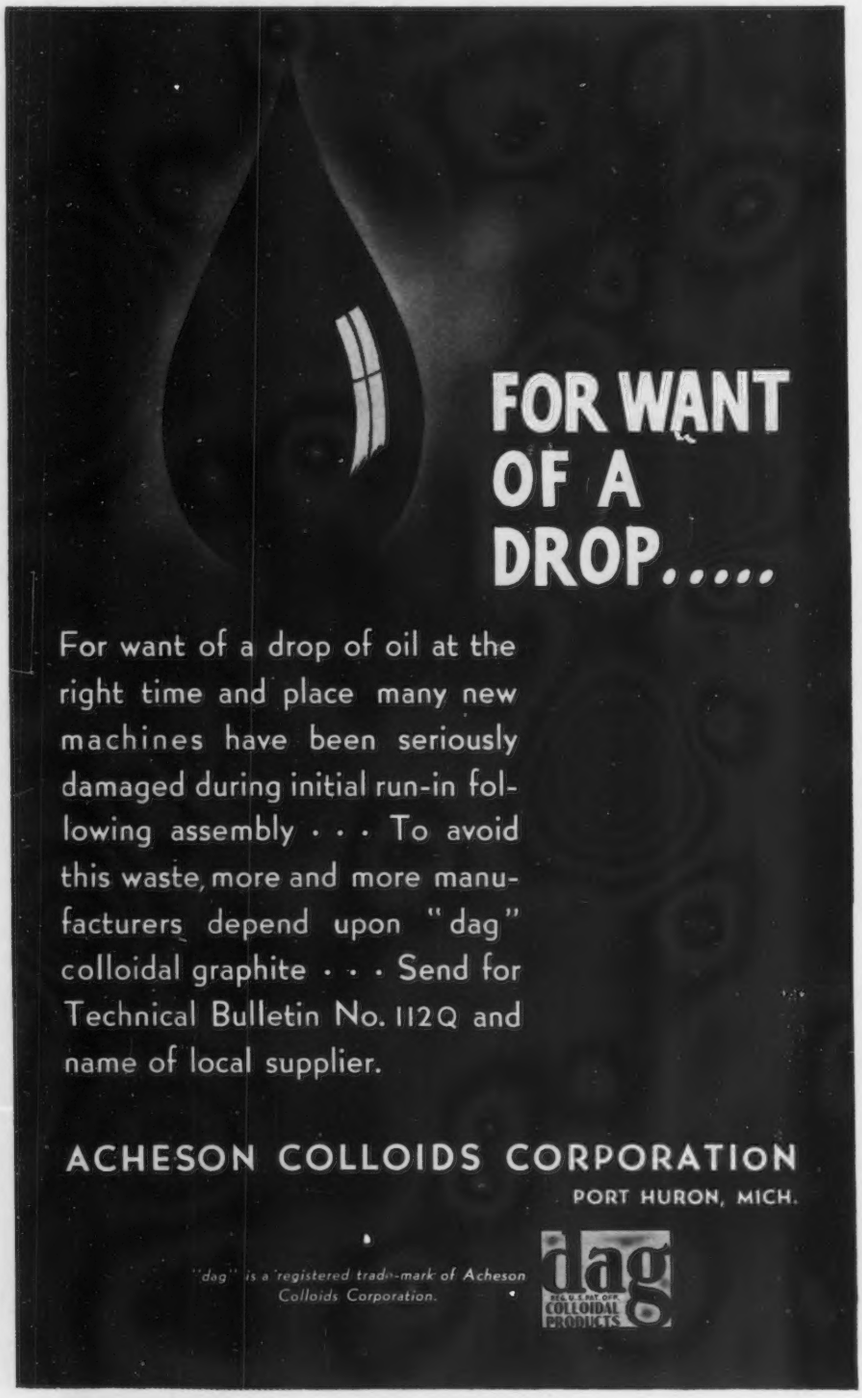
Thus, there are developing plans not only to obtain this scrap, but to develop means of extracting the full re-use value of its nickel content. The OPM last fall distributed a series of standards to be used in segregating alloy scrap in a manner which would permit the fullest utilization of the alloys in each grade.

Aside from the importance of this material in the war effort, the OPA nickel scrap schedule (No. 8) makes it profitable to segregate the alloy material, as it affords premiums on the basis of nickel and chromium content.

While study is being given to various means of separating this alloy material from plain carbon steels, it is the general belief that the only real answer to the problem lies in segregation at the source—the milling machine, the drill press, etc.

In some of the larger plants this practice has been highly developed, but in many other plants there is still much work to be done.

Standing out among the conflicting trends of the scrap industry is the one fact that the days when scrap was simply scrap are past. Tomorrow's scrap yard will be a processing plant, where all the metal is scientifically separated. Steps in this direction have already been taken by several interests, one of which is geared up to the point of reclaiming the tungsten in electric light bulbs.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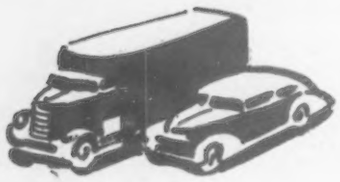
Assembly Line . . .

• Ford record on conversion to war products shows bombers, airplane engines, tanks, tank engines, many other items appear on this company's schedule . . . Synthetic fiber from soybeans reaches limited production stage.



DETROIT — A comprehensive round-up of Ford activities in connection with war manufacture includes more than a dozen significant projects. As each one of these was undertaken by the Rouge company, it has been discussed in the press, but this up-to-date record undoubtedly will interest many.

BOMBING PLANES—Complete Consolidated B-24 bombers, along with sub-assemblies and parts to be shipped to other assembly plants, will be produced in a new $58,500,000 plant at Willow Run near Ypsilanti, Mich., now nearing completion. Total contracts for bombers and bomber parts total $524,850,000. Some machinery already is installed in the plant and manufacture of parts has begun but, to speed up production, Ford is also making use of the old Ford tri-motor plant at Dearborn, abandoned a decade ago and since filled up with ancient steam engines and other museum pieces. Now fabricating equipment and assembly jigs have been installed here and preliminary engineering and production planning is underway for the entire project. In the Dearborn hangars and shop, ten complete bombers will be built on an educational order and for experimental purposes. More than 200 Ford engineers, draftsmen and production planning experts, who spent months at the Consolidated plant at San Diego, are directing the preliminary program. Instruction classes to train students in riveting, welding and other important aircraft trades are in progess.

AIRPLANE ENGINES—Orders for production of Pratt & Whitney 18-cylinder, double-row radial engines total $290,700,000. Delivery of engines to the Army has been underway for several months. The building which, with its equipment, cost $37,536,000, also houses an aircraft apprentice school in which thousands of employees have been training for months to take over their roles in the production of airplane engines.

TANKS—The company is proceeding with plans to build medium tanks for the Army at the rate of 400 a month. Here it is known that the assembly lines won't move for a year, maybe more. The tank to be built will be the M-4. Plans call for fabrication of parts and sub-assemblies at the Rouge plant, with final assembly at the Highland Park plant.

STEEL FOUNDRY—A $4,000,000 steel foundry, to be used largely for airplane and tank parts, is under construction. Ford has pioneered in the use of steel castings for automobile parts and tractor parts and will adapt this mass production technique to such things as landing gear struts, airplane cylinders and crankshafts, and tank hulls. The foundry will be completed early in this new year. It will have a capacity of 300 tons a day.

MAGNESIUM FOUNDRY—This operation, with its output of 110,000 lbs. of magnesium castings a month, is already an old story at the Rouge plant. It was one of the original undertakings in the defense program. It is supplying magnesium castings for airplane engines built at the Rouge and for other aviation factories throughout the nation.

ARMY MOBILE EQUIPMENT—Staff cars, 4x4 reconnaissance and command cars, and specially designed bomb service trucks and jeeps have been among the output at the Rouge, along with field kitchens sent to England by the British War Relief Society. Additional orders for military vehicles are now in process of production, including some 17,000 jeeps, the quarter-ton midget wonders of this war.

FOREIGN DEFENSE ORDERS—Approximately $3,000,000 worth of orders for export are being filled by Ford every month. The orders chiefly are for parts and assemblies of motor vehicles and are being shipped to England, China, Australia, New Zealand, Egypt, India and other foreign points receiving aid under the Lend-Lease Act.

FORD AIRPLANE ENGINES—Tests are still in progress on this V-type supercharged engine, expected to develop up to 1800 hp. at altitudes up to 32,500 ft.

AIRCRAFT APPRENTICE SCHOOL—Already mentioned, this facility is in addition to the special service schools and the Ford Trade School. It is equipped to train 3000 students at a time and, as mentioned, has been "in production" for months.

NAVY SERVICE SCHOOL—For the training of recruits in mechanical trades. The school, provided and equipped by Henry Ford at no expense to the government, is staffed by Ford Trade School and Apprentice School instructors.

ARMY SERVICE SCHOOL—Two educational projects, one at the Rouge plant and one in the field, have been sponsored for Army instruction.

FORD CARGO VESSELS—Ten vessels of the Ford fleet, five of them ocean-going ships, have been taken over by the U. S. Maritime Commission to haul defense materials.

RED CROSS MOTOR CORPS—In the Highland Park Plant, facilities have been placed at the disposal of the Red Cross for the training of women volunteers in automobile mechanics.

Not mentioned in the Ford official summary is the tank engine, which is known to be in the development stage, and work on the manufacture of bomb sights, which also is in the offing.

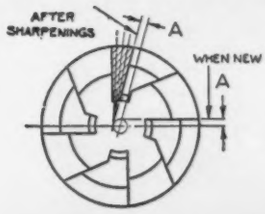
THE bomber program is an illustration of how automotive work—in wartime or in peace—is spread among suppliers. Sixty in-

WASTE NOT... WANT NOT

Grinding face on saucer wheel

"*Acorn*" Dies will cut perfect threads until repeated sharpenings have ground away more than half of the lands. Now that universal demand makes it hard to get all the dies you need, be sure you get full value from your present stock—by using them until further grinding is not practical. Here's the way to sharpen them so they will last longest and cut best.

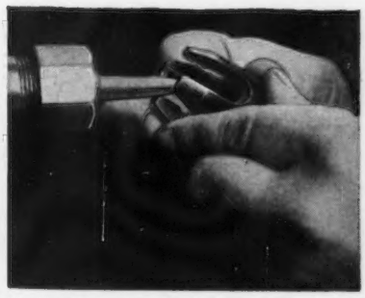
To grind the cutting face hold the die as in the illustration and grind the cutting face on a saucer wheel. Take light cuts so as not to burn the threads. Maintain the original angle of the cutting face with relation to "center" (see diagram). See that the same amount of metal is removed from each land.



When grinding the face, maintain original cutting angle this way

Grind the chamfer at the die's throat with a pencil wheel. (See below.) Put a slight relief on the chamfer; that is, remove more metal toward the heel than at the face. Use a solid rest for your hands to hold the die steady.

Special holders can be obtained for the smaller size dies which are difficult to handle.



Grinding chamfer with pencil wheel

If properly ground, the die will still cut perfect threads, even though the lands are quite thin.

Actually "*Acorn*" Dies are very easy to sharpen and a little practice will enable anyone to do a good job and double or treble their normal life.

This is one of a series of advertisements published by Greenfield Tap and Die Corporation to help users get greater production from their small tools in these critical times, through making useful facts more widely known

GREENFIELD TAP AND DIE CORPORATION • GREENFIELD, MASS.

DETROIT PLANT: 2102 West Fort St.
WAREHOUSES in New York, Chicago and Los Angeles
In Canada: GREENFIELD TAP AND DIE CORP. OF CANADA, LTD., GALT, ONT.

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TAPS • DIES • GAGES • TWIST DRILLS • REAMERS • SCREW PLATES • PIPE TOOLS

dependent firms in the Detroit area and 12 Ford Village Plants in Michigan and Ohio have been assigned more than 50 per cent of the job of building gages, fixtures, dies and tools for the bomber plant. An estimated 6,000,000 hr. will be required to produce this tooling. Schedules in supplying plants are mostly on two shifts, while the Ford Village Plants (now devoting nearly 80 per cent of their production to military equipment) have extended their working day from eight hours to 10, and some of them are working six hours on Saturday.

Ninety per cent of the facilities in the tool and die building at the Rouge plant have been devoted to war work, about 50 per cent of it to manufacturing tools for the bomber project.

With the question of rubber supply foremost in interest right now, there have been a lot of questions about the progress of Ford's experiment on developing a source of rubber in South America. It appears that contributions to date from this program are of great value but do not actually indicate the possibility of producing much rubber in this hemisphere in the immediate future.

The Ford experiments have been carried on over a period of 14 yr. A $20,000,000 project in the jungles of the Amazon Valley in Brazil was the first serious attempt ever made to cultivate rubber in the Western Hemisphere, original home of the rubber tree. When Brazil was the sole source of rubber, the product was obtained by tapping wild trees. Seeds smuggled out of Brazil to the Far East were the foundation of the scientific rubber growing there. When Ford obtained his two-and-a-half-million-acre concession in Brazil in 1927, it was necessary to obtain clones in the Far East and re-import them into Brazil.

SUICIDE SUBS: This is one of the two-man Japanese submarines that was beached on the Hawaiian Island of Oahu during the Japanese attack on Pearl Harbor. The sub is about 41 ft. long, with a 5 ft. beam, and has a cruising radius of about 200 mi. at low speeds. They are used for the extremely dangerous task of sneaking into harbors and releasing their torpedos, and for reconnaissance work.

Much of the original Ford plantation proved unsuitable, partly, at least, because of difficulties in obtaining labor in the remote jungle area, so Ford then cut a new plantation from thick jungles high up on a plateau in another area. Today 3,651,500 rubber trees have been planted there. However, production is on a limited scale, amounting to only about 750 tons of creamed latex for the forthcoming year, it is estimated. By 1950, it is estimated, annual production will be 7500 tons. The eventual goal is the production of 38,000 tons, the approximate annual rubber requirement of the Ford company itself.

THE greatest contribution is that Ford experts appear to have perfected types of rubber trees which resist the fungus diseases that have blighted rubber production in the Western Hemisphere.

Another of Ford's experiments with materials has reached the stage of limited production, it has been announced. It is the manufacture of synthetic fiber from soybeans. A pilot mill operation at the Highland Park plant is being moved to Dearborn, where it will occupy part of the new building opposite the Ford Airport and Proving Grounds. Fiber production will be approximately 1000 lb. per day. This synthetic product is similar to sheeps' wool and will be used in a blend which will be 75 per cent wool and 25 per cent soybean fiber. The cost of the synthetic is said to be half the cost of wool.

The processing will begin at the company's Rouge plant in the present soybean mill where oil is extracted from the bean. Protein, from which the fiber is made, will be removed from the oil-free meal at the farm products laboratory operated by Ford. The protein then will be dissolved to produce a viscous, stringy substance that emerges from a 500-hole spinneret in a shape like fine noodles. The extruded filaments are run through an acid bath, immersed in formaldehyde to set the fiber, then are cut to desired lengths and dried under controlled temperature and humidity. The material is then prepared for spinning and afterwards shipped to mills that weave Ford upholstery. Wool and other fibers are added there.

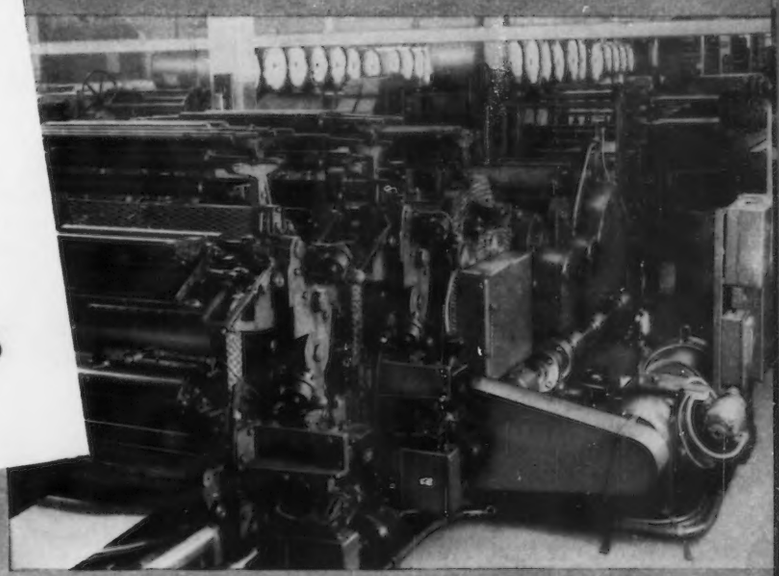
Easier, Safer, Better Welding. The Allis Chalmers Welding Positioner handles ge fabricated steel shapes as heavy as 50 tons. It extends the range of jobs ich can be handled with automatic welding machines and makes hand welding ier and safer . . . Oilgear Transmissions make possible maintaining pre-deter- ned automatic welding speeds within close limits, they provide ample power to ndle substantial overloads, and provide steplessly variable speeds to insure nness of automatic welds.

For a Wide Range of Speed Variation and Simple Control. Johnson and Jennings, Automatic Stoker Manufacturers, of Cleveland, Ohio, report that the Oilgear Units shown in the photograph are adjusted over a 16:1 ratio of speed variation and are doing a very successful job of stoker driving. Oilgear drives eliminate the necessity of special interlocking devices and are conveniently controlled from a central panel. Oilgear Transmissions are steadily gaining popularity with stoker manufacturers and users.

3 Outstanding Examples

OF THE MANY ADVANTAGES AWAITING YOU IN OILGEAR TRANSMISSIONS

For Far Greater Accuracy. *Below:* Ten Oilgear type DEC-1212 Transmissions are used to drive special Kant-Slip Continuous Form Printing Presses installed at the Standard Register Company of Dayton, Ohio. These presses must run with far greater accuracy than conventional web presses. The accurately controlled, smooth, cushioned power of Oilgear Transmissions protects register while adjusting and keeps stock spoilage down to a minimum. Presses can turn out 12,000 impressions per hour.



The unusual success of Oilgear Fluid Power Transmissions in so many *different* applications has led many machine designers to completely revise their opinions of what hydraulic transmission of power can accomplish. Oilgear Transmissions assure designers of smooth, uniform acceleration, high variable speed, accurate, sensitive control over a wide range, and efficient transmission of power in their machines; a combination which has resulted in safe, easy to operate automatic machines, higher speed, more productive machines and improved processes and products.

The list of special applications where Oilgear Transmissions have proved more productive and more economical is growing steadily. They are in use in practically every leading industry. If it's important that you get the most out of your production machines, it may well pay you to investigate the complete line of Oilgear Transmissions. Send now for case histories showing what Oilgear has accomplished either in your field or in a related field. Don't wait, but send now for this important information. Also send coupon for Bulletins 47000 and 60000 which give complete engineering data about the entire line of standard Oilgear Transmissions. THE OILGEAR COMPANY, 1303 W. Bruce Street, Milwaukee, Wisconsin.

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Washington . . .

• Supreme Court says employers may make anti-union speeches and issue anti-union bulletins without violating the Wagner Act, if they do not go too far . . . However, employer's statements as well as his acts will be considered.

WASHINGTON—Employers, after all, do have some privileges under the recently celebrated bill of rights. Although it hemmed these privileges with qualifications that heretofore were considered to be non-existent, the Supreme Court last week did permit certain tolerances with free speech that had been barred by the old National Labor Relations Board.

In its excessive leanings toward organized labor, the old board muzzled employers against saying anything unkind about the Wagner Act, a sacrosanct legal document in the eyes of the former board, which interpreted the act by emotion rather than by judicial construction. The reorganized board fortunately for all concerned does not twist the act into a reflection of personal prejudices. It does, however, have on its hands the job of at least partially straightening out kinks of this sort that were put into the law by former members of the board.

SUCH a task was given the board by the Supreme Court in tossing back two joint cases whose board findings the Court, rather over-cautiously, it would seem, thought were doubtful as to their adequacy. The Court definitely did not raise the limits on free speech as much as might be desired but in the cases of the Virginia Electric & Power Co. and the Independent Organization of Employees, it did say in substance that employers could—if they did not go too far—make anti-union speeches and issue anti-union bulletins without violating the Wagner Act. At the same time, the Court in remanding the cases to the board said that the board may consider what an employer said as well as what was done in determining whether there was interference with the right of employees to self-organization.

In passing the cases back to the board the Supreme Court asked it to determine the issue of whether the employer dominated a labor organization. The Court was uncertain about the board's findings, ordering the Virginia company to "disestablish any union of its employees as company dominated." In its 7 to 0 decision (Justices Roberts and Jackson not participating) written by Justice Murphy, the Court said it was not certain whether the board based its conclusion upon the whole course of the employer's conduct but said that the conclusion "seems based heavily upon findings which are not free from ambiguity and doubt."

The Supreme Court in reversing the Circuit Court of Appeals for the Fourth Circuit which set the Board's order aside gingerly said that it did "not mean to intimate any views of our own as to whether the Independent was dominated or suggest to the Board what its conclusion should be when it reconsiders the case."

BUT the Court did gently intimate that the Board had encroached somewhat on the right of free speech when it found that speeches made by company representatives were unfair labor practices. The Court, however, as if to mollify the Board, said that it did not appear that the Board raised the company utterances "to the stature of coercion by reliance on the surrounding circumstances."

"If the utterances are thus to be separated from their background," said the Court, "we find it difficult to sustain a finding of coercion with respect to them alone. The bulletin and speeches set forth the right of the employees to do as they please without retaliation by the company."

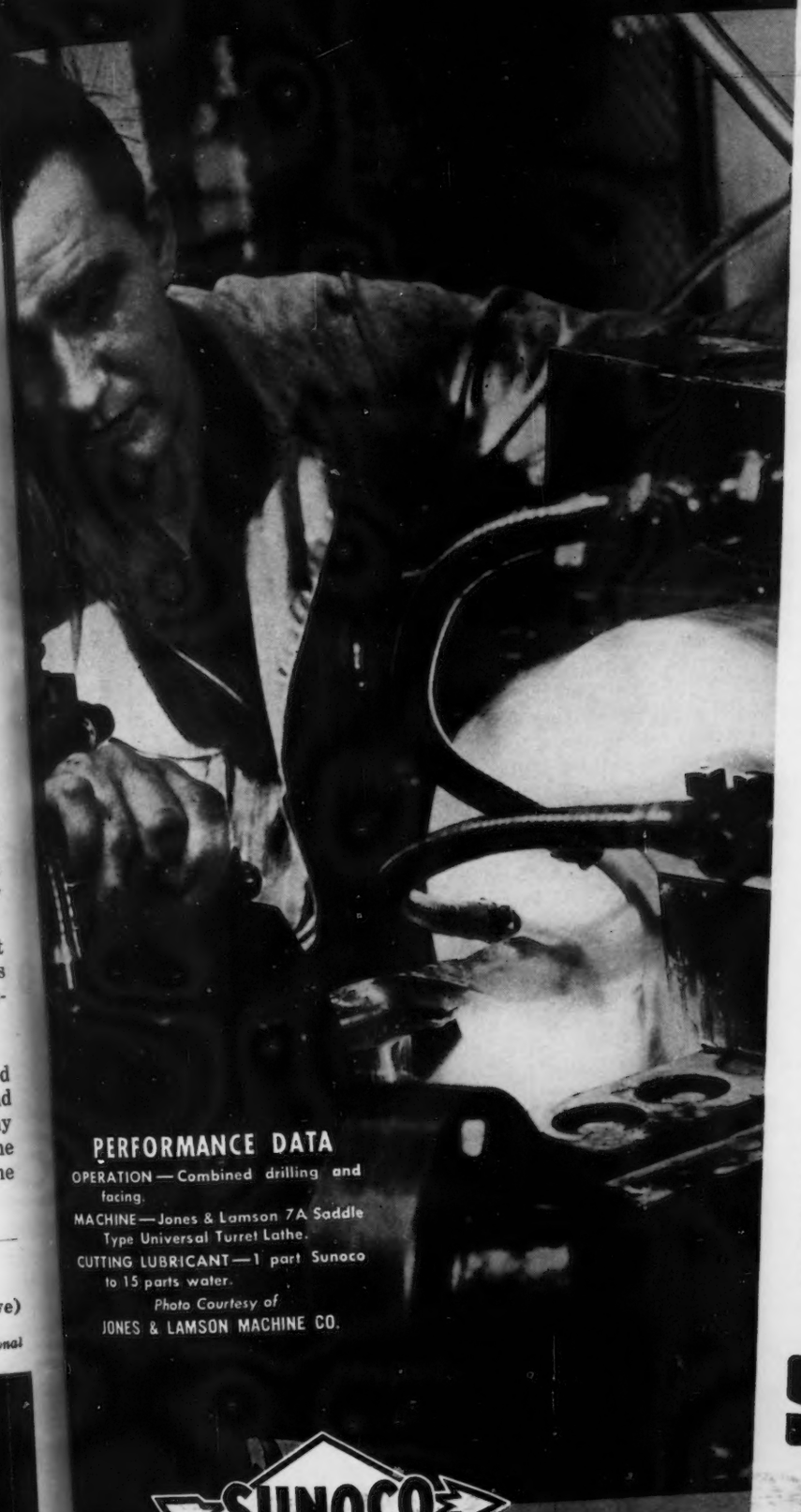
But in effect the court held that with enough "background" plus utterances pieced together a violation of the act could be found.

THE proceeding involved charges brought by CIO and AFL unions alleging that company coerced workers into joining the Independent and that therefore the

STEEL PLANT BLACKOUT: Billows of smoke recently hid Carnegie - Illinois Steel Corp.'s Gary, Ind., plant, (above) when the company ordered its first practice blackout.

Photo by International

SAVE TOOLS..TIME..MATERIAL *with* SUNOCO



PERFORMANCE DATA

OPERATION—Combined drilling and facing.

MACHINE—Jones & Lamson 7A Saddle Type Universal Turret Lathe.

CUTTING LUBRICANT—1 part Sunoco to 15 parts water.

Photo Courtesy of
JONES & LAMSON MACHINE CO.

SET A HIGH P-Q* FOR YOUR PLANT

Here's how to make a triple saving in your shop . . . and pave the way to a higher P-Q*(Production Quota). Put Sunoco Emulsifying Cutting Oil on the job!

SAVE TOOLS! Sunoco's high heat-absorbing and lubricating qualities prolong tool life . . . help keep tools sharper, longer. That's important today with high speed tool steel hard to get.

SAVE TIME! Today's production schedules demand speed. Again Sunoco proves your ally! A flood of Sunoco over tools and work permits heavy cuts at high speeds . . . faster production . . . increased output per unit.

SAVE MATERIAL! Sunoco users report savings in materials due to decreasing rejects caused by inaccuracies and faulty finishes. Sunoco puts "nth" degree accuracy on a production basis.

TEST SUNOCO in your own plant . . . under your own operating conditions. Call in a Sun "Doctor of Industry" for specific recommendations. It's the first step toward setting a higher P-Q*. Write to SUN OIL COMPANY, Philadelphia.

**Production Quota*

SUNOCO
EMULSIFYING
CUTTING OIL

SUNOCO

SUN PETROLEUM PRODUCTS HELPING INDUSTRY HELP AMERICA

Photo by Wide World

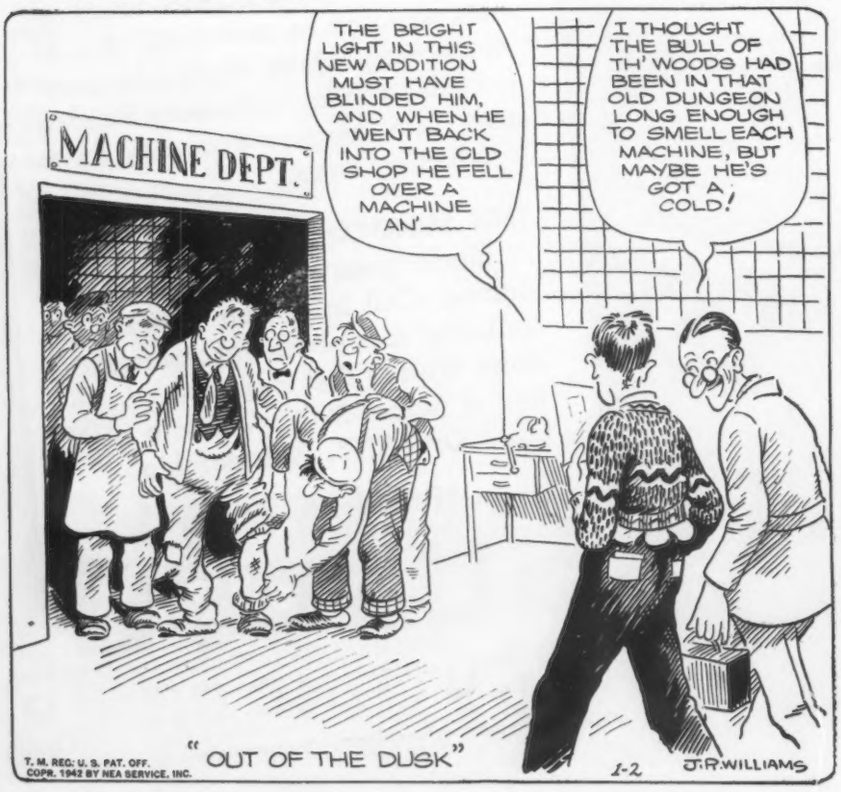
NEW U. S. CRUISER: Among the latest additions to the Navy is the Atlanta, (above), shown enroute to the Brooklyn Navy Yard for christening Dec. 24.

Independent was company dominated.

The Supreme Court reversed the lower court decision because NLRB did not base its findings on the "totality of the company's activities" but merely on the strength of the speeches and the bulletin which it found to be coercive. However, the Court said in overthrowing the company's contention that freedom of speech would be abrogated if a company were not free to say anything to its employees about unions without it being considered an unfair labor practice, that such verbal conduct if coercive was an unfair labor practice, but that the company might say anything it wanted to, provided it was not offensive to the National Labor Relations Act —coercive.

"Neither the Act nor the Board's order enjoins the employer from expressing its view on labor policies or problems, nor is a penalty imposed upon it because of any utterances it has made," said the Supreme Court. "The sanctions of the Act are imposed not in punishment of the employer but for the protection of the employees. The employer * * * is as free now as ever to take any side it may choose on this controversial issue. But certainly conduct though evidenced in part by speech may amount in connection with other circumstances to coercion. If the total activities of an employer restrain or coerce his employees then those employees are entitled to the protection of the Act. * * * The mere fact that language merges into a course of conduct does not put that whole course without the range of otherwise applicable administrative power."

THE BULL OF THE WOODS — BY J. R. WILLIAMS


MACHINE DEPT.
THE BRIGHT LIGHT IN THIS NEW ADDITION MUST HAVE BLINDED HIM, AND WHEN HE WENT BACK INTO THE OLD SHOP HE FELL OVER A MACHINE AN'——
I THOUGHT THE BULL OF TH' WOODS HAD BEEN IN THAT OLD DUNGEON LONG ENOUGH TO SMELL EACH MACHINE, BUT MAYBE HE'S GOT A COLD!
T. M. REG. U. S. PAT. OFF.
COPR. 1942 BY NEA SERVICE, INC.
"OUT OF THE DUSK"
1-2
J.R.WILLIAMS

New Defense Transportation Office Headed by Eastman

Washington

• • • **The Office of Defense** Transportation to be headed by Joseph B. Eastman was created Dec. 23 by Executive Order. The functions of the newly created agency are to coordinate railroad, motor, inland waterway, pipeline, air transportation and coastwise and intercoastal shipping, and analyze and compile estimates of the requirements the war effort may impose on the domestic transportation facilities, seek their maximum use, stimulate expansion by advising SPAB of priorities needed, prevent congestion of traffic, etc. Mr. Eastman is Chairman of the Interstate Commerce Commission.

Removal of all Tariffs Between U. S., Canada Urged

Washington

• • • **Recommendations** that tariffs be lifted between the United States and Canada to speed the war effort were made Dec. 23 by the joint war-production committees appointed as a result of the Roosevelt-King conference at Hyde Park, Nov. 6. This was announced by the White House.

BLANCHARD

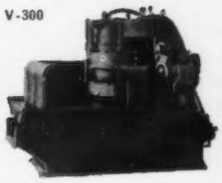
V-357

NO. 11

V-326

NO. 18

V-300



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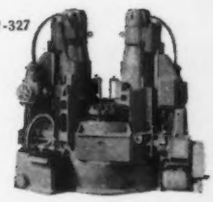


NO. 16A DUAL

BLANCHARD WHEELS

Blanchard Surface Grinders are cutting costs and improving quality on both production and tool work

BLANCHARD

THEY are massive, powerful machines with ample weight of metal where it is needed for rigidity. Their controls are convenient and easy to operate. They generate a flat surface by the rotary motions of work and wheel—this makes wheel truing unnecessary and saves cost and time, especially when grinding from the rough.

Since Blanchard Grinders practically eliminate set-up time, the output per machine is high, even with an average operator.

A new development is the production of very fine finishes by Blanchard Grinding. If your work requires flat surfaces with a finish of a few microinches (by profilometer) the No. 11 or No. 18 Blanchard Surface Grinder with fine grit wheel, made by Blanchard, will produce them for you.

To keep Blanchard Grinders at maximum efficiency, it pays to use wheels manufactured by Blanchard.

A General Catalog covering the complete line of Blanchard products, or catalogs on any specific Blanchard product, will be sent on request.

BLANCHARD

THE BLANCHARD MACHINE COMPANY
64 STATE STREET, CAMBRIDGE, MASSACHUSETTS, U. S. A.

WEST COAST . . .

• War in Pacific gives new importance to Coast steel warehouses, puts responsibility on them for metal which may be used in emergency repairs necessitated by military action.

SAN FRANCISCO — War is bringing new responsibilities to Pacific Coast steel warehouses, elevating their importance from a mere link in defense manufacture to a position of potentially critical military importance.

Suppose a damaging blow were leveled against vessels of America's Navy. Suppose wounds from an enemy attack were to send merchant vessels limping into port, possibly a port other than that to which they customarily go for repair. Suppose quick blows were struck at any of the myriad Naval and military outposts on the Pacific Coast or outlying territories. None of these things is possible in the Midwest or probable on the Eastern seaboard, but the Pacific Coast is on the front line in the combat zone.

Emergency repairs necessitated by military action throws their immediate load on steel stocks built up by the military branches . . . stocks which a month ago were the target of "hoarding" criticisms. But in case these stocks should be damaged or destroyed by the same action necessitating the repairs, or in case the burden of repairing the damage falls upon civilian facilities, then the critical role is played by the steel warehouses.

Mills cannot be expected to, and in many cases are unable, to fill on short notice from Pacific Coast stocks orders for many types of steel required for emergency repairs, repairs whose immediate importance lies in promptness of execution. This is particularly true when special alloys or unusual sizes are demandad. Mills themselves will be the first to indorse this view.

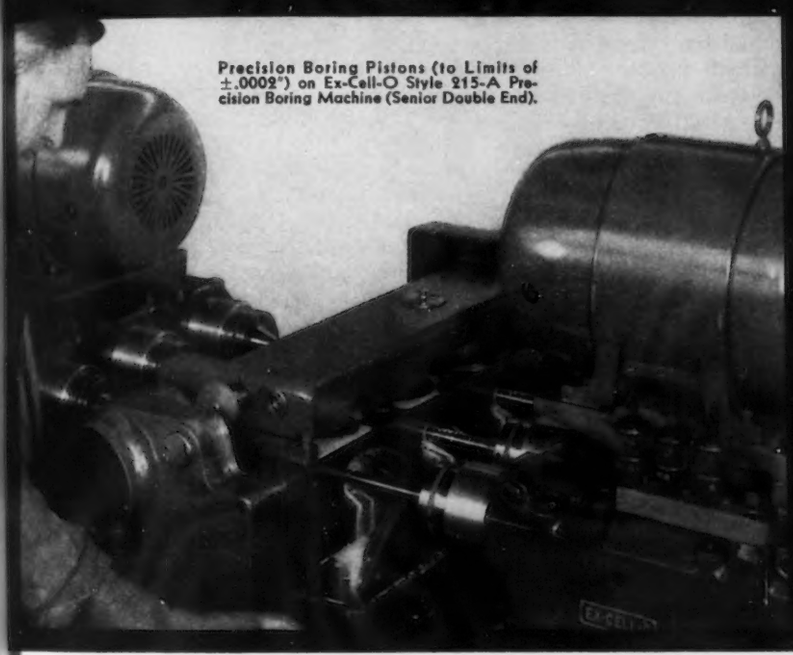
MUCH of the credit for keeping Pacific Coast shipyards up to or ahead of schedule is credited to the initiative of the yard in seeking out and drawing upon warehouse stocks. So far, the yards have been able to draw on the warehouses to get them over the hump of initial operations. But now, more and more of the warehouses are beginning to look like the floor of the Biltmore Bowl ballroom at 10 a. m. Sunday. Bare cupboards are not going to help in case of military emergency. Unless Pacific Coast warehouse stocks are replenished, battleships may have to be repaired with steel from Omaha.

Just how well Pacific Coast warehouses have been faring under present priority regulations is shown by the report that they received only one-third of their quota on A-9 ratings during the third quarter of 1941. This, coupled with apparently well founded rumors that substantial deliveries were made on unrated orders to industrial customers in the East, explains in part why some Coast warehouse operators dread reading war news.

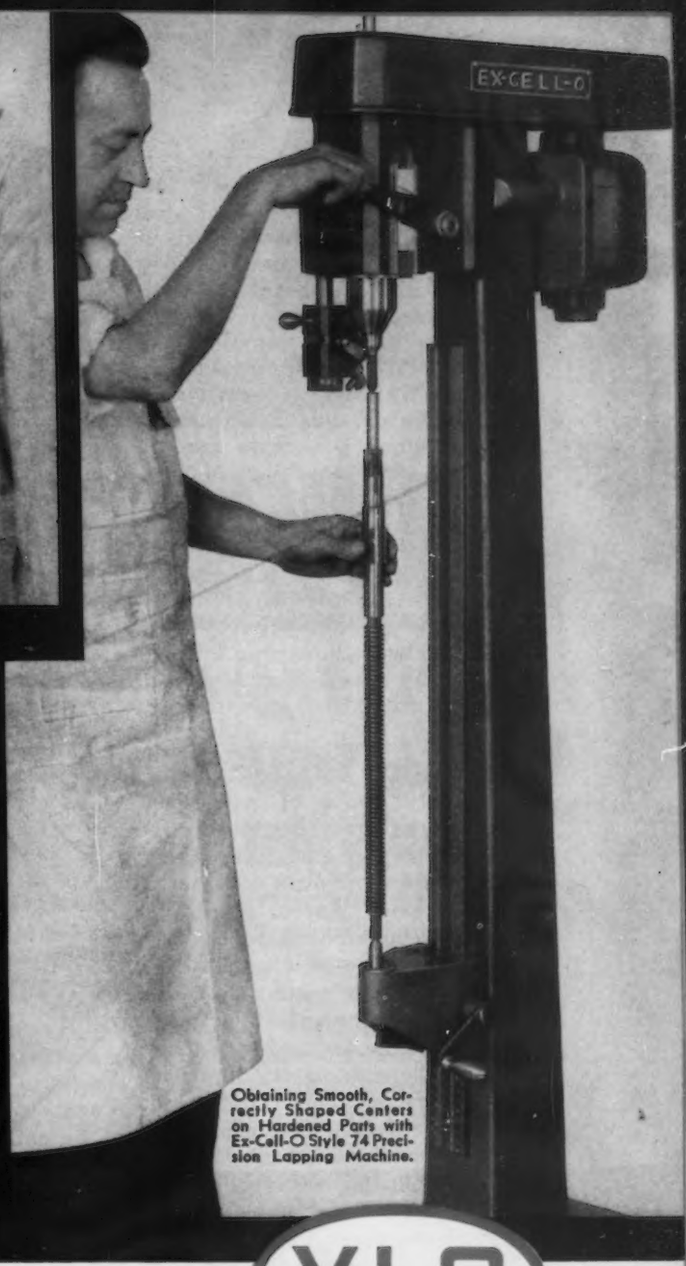
As for warehouse prices, further revision of the schedule affecting the Pacific Coast seems more likely every day we are at war. Though the schedule went into affect after war was declared, it is evident that the 35 cents per hundred weight premium which Coast warehouses are allowed to charge on certain products reflects a situation in which some steel comes across the continent all-rail and some still comes through the canal. It is probable that the proportion of steel which was brought all-rail before the war declaration was not sufficiently weighted in determining that the premium should be 35c. instead of the approximate 80c., which is the average differential between water and rail. Had peace prevailed, reports which Coast warehouses give to the OPA would have reflected the ratio of water and rail transportation more accurately and adjustments would have been made. But waiting for such reports now can only be a formal-

PLANT SURVEYS FOR SUB-CONTRACTS: Three of the 242 northern California manufacturing concern representatives being interviewed for a survey of their plants for prospective quartermaster supply manufacturing for the Army.

Precision Grinding Tapered Threads on Hardened Aircraft Studs (from the solid) on Ex-Cell-O Style 33 Automatic Thread Grinder.



Precision Boring Pistons (to Limits of ±.0002") on Ex-Cell-O Style 215-A Precision Boring Machine (Senior Double End).



Obtaining Smooth, Correctly Shaped Centers on Hardened Parts with Ex-Cell-O Style 74 Precision Lapping Machine.

PRECISION

XLO

EX-CELL-O *means* PRECISION

WHATEVER machining job you're doing today—or will be tomorrow—to help this country win the war that's thrust upon it, it's a thousand to one that *precision* is an absolute requirement. Accuracy and finish in metal cutting work . . . with the highest possible rate of production . . . are now more insistently demanded than ever before. This is why Ex-Cell-O *precision* machine tools are in much greater demand—why they're preferred by prime and subcontractors who are undertaking to produce the millions of metal parts that United States must have without a moment's unnecessary delay. If you want the best—and only with the best can you attain the speed and accuracy now imperative—you'll want Ex-Cell-O *precision* machine tools. They're *precision*-designed, *precision*-built, and give *precision* results . . . because of their superior construction and many automatic features they work so smoothly that operators with just ordinary skill can produce quickly and efficiently with them.

EX-CELL-O PRECISION THREAD GRINDERS . . . eight styles, covering wide range of work for internal and external threads, giving every manufacturer the choice of the exact type of machine best suited to his specific requirements.

PRECISION BORING MACHINES . . . pioneer also in development of precision boring as a modern machining process, Ex-Cell-O has designed nine standard machines for boring, facing and turning—machines that handle most of today's precision boring needs.

PRECISION LAPPING MACHINES . . . fast and accurate lapping of female work centers and internal surfaces is had with the use of Ex-Cell-O Precision Lapping Machines—Style 74 for Center Lapping (illustrated above) and Style 71 Internal Lapping Machine. Both machines are designed and built to Ex-Cell-O's high precision standards of manufacture.

EX-CELL-O CORPORATION • DETROIT, MICHIGAN

THREAD GRINDING, BORING AND LAPPING MACHINES • TOOL GRINDERS • HYDRAULIC POWER UNITS • GRINDING SPINDLES • BROACHES • CUTTING TOOLS • DRILL JIG BUSHINGS • DIESEL FUEL INJECTION EQUIPMENT • R. R. PINS AND BUSHINGS • PRECISION PARTS

ity. Water transportation of steel around the canal is now just about as theoretical as international law. Barring whatever boats may now be en route, steel for the Pacific Coast, for practical purposes, may now be regarded as moving entirely by rail. While the present warehouse price schedule lasts, customers can enjoy a bargain sale, if they can find anything to buy, secure in the belief that prices will be going up soon. Whatever gravy warehouse operators may have gained during the pre-schedule period when they were basing their prices on all-rail shipment and some steel was still coming by boat will, for the time being, be passed on to the man who is always right.

PROMINENT in the backwash of the first wave of patriotism after Pearl Harbor, striking welders, members of an independent union, were in West Coast headlines last week. War or peace, the situation reflected by this labor dispute is the same as originally reported in these columns several weeks ago. In the unfamiliar position of being struck against instead of being the striking organization, the AFL put on the screws for all it was worth in a pressure game where the man with the most power wins. A coastwide closed shop AFL contract signed last spring with shipyard operators gave the AFL a tight hold on available jobs and the right to replace striking members of the independent welders union just as though they had quit or been discharged. That was a powerful club, and it was a wonder the independent union dared stand against it in the first place. With the declaration of war, the AFL was able to point an accusing finger of scorn at any welders who walked off the job and give vent to patriotic indignation. Undoubtedly the declaration of war was the decisive factor in keeping the lid on what might have been a Pandora's box of trouble. Of the two other parties affected by the dispute, shipyard owners naturally were bound to honor their sound contract with the AFL, and in any case would have preferred to do business with an established labor organization, which was willing to bind itself and police its own ranks, rather than an upstart independent. The other interested party, OPM's Sidney Hillman, stayed at a discreet distance from the actual scene of the trouble and, as far as public utterances were concerned, took the sure fire political course of pointing to a menacing Hitler 3000 miles in the opposite direction from the strike.

Aside from bringing out just who stood where and why, the strike had very little effect. Just about the time the strike started, the Navy issued a call for several hundred welders to go to Hawaii, giving anyone who had truly conscientious scruples against paying multiple AFL dues a clear cut opportunity to stop doing so. To their credit, some of the strikers signed for Island duty.

COAST industry in general now is running faster than ever after an initial slowdown the first week after war was declared. The general slowdown which followed the shock of war lasted about a week. During the second week things picked up substantially. Tremendous pressure was brought on defense plants to break any bottlenecks and get into full production. The spirit exemplified by aircraft employees who offered to donate a Sunday's work if management would donate the materials has been general.

Probably no section of the country will be as hard hit by rubber rationing as the far West where spaces are open and distances long. But any hope that the far West will overcome the shortage through the raising of guayule plants is not shared by those who have made close studies of experiments. Probably the biggest barrier to guayule replacing rubber trees during the war is the fact that four years are required to raise them before they are ready for harvest. Then, the whole plant is harvested and another four years is required to grow a second crop on the same soil. Experimental crops grown under different soil and climatic conditions have shown a wide variation in raw material yield. To bring guayule into commercial production, new harvesting machinery would have to be developed, and, once developed, would require badly needed metals for manufacture. The quality of the crops produced experimentally have not shown them to be satisfactory for making tire treads.

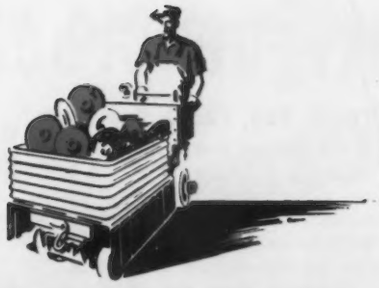
Chief rubber development on the Coast is the granting of a A-1-d rating to United States Rubber Co. for construction and equipping of a Los Angeles plant to speed production of self-sealing fuel and oil tanks for airplanes.

Reports from Miami, Ariz., indicate that production of the Inspiration Consolidated Copper Co. is to be increased 25 per cent as soon as new leaching tanks and other additions to present capacity, now under construction, can be completed. Inspiration monthly output will rise from 8 million to 10 million lb. Both Inspiration and Miami Copper Co. beat the government's appeal for a seven-day schedule in mines by more than a year. Miami, too, looks forward to a substantial increase in output, but this will be dependent on results of a Defense Plant Corp. development at its Castle Dome property.

WAR emphasizes the necessity for rapid completion of generating capacity at Grand Coulee Dam, according to Paul J. Raver, administrator of both Grand Coulee and Bonneville. "The War Department has informed us that many of the future defense plants in the Northwest must be located east of the Cascade mountains for obvious military reasons," Raver said. "While this does not mean that all defense loads will henceforth be located in the interior, it does mean a considerable shift in the emphasis of the industrial program. (Grand Coulee is located in eastern Washington.)

"Thus decentralization of defense plants becomes imperative in the Northwest industrial setup. With 15 Grand Coulee generators, having a total capacity of more than 1,500,000 kilowatts, scheduled for rapid installation, we must vastly expand our construction of feeder lines from that source. While our heaviest circuits can carry 100,000 kilowatts, it will be necessary, in order to handle this Grand Coulee capacity, to build more than a dozen such lines. How rapidly these will be pressed into service is anybody's guess."

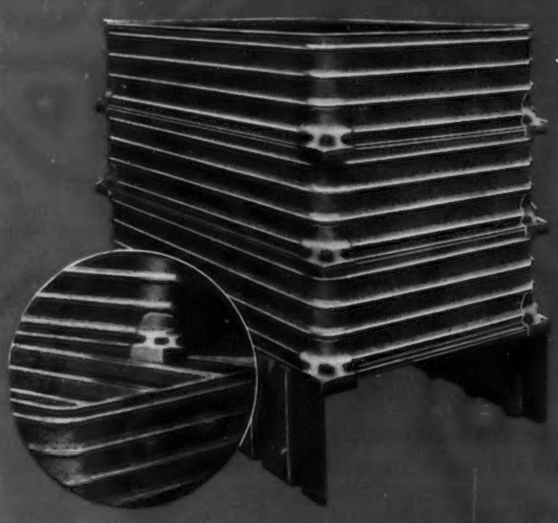
Learn to say



TRUSCONVEY

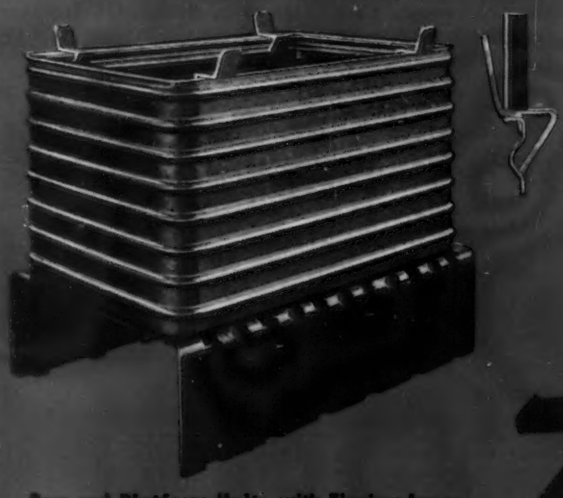
WHEN YOU WANT EFFICIENT MOVEMENT AND DELIVERY OF MATERIAL!

● There's no delay when you TRUSCONVEY! • First, because your parts and materials are neatly and *conveniently stored* throughout your plant, in Truscon Steel Boxes on Truscon Skid Platforms. • Second, because this ship-shape storage permits quick availability to factory trucks, and rapid movement to production machines and assembly lines. • Truscon Steel Boxes and Skid Platforms are noted for their long service, because they are designed to meet the particular requirements of each individual material handling job. They can solve a wide variety of handling problems, simplifying operations and speeding production. • Let us study the handling conditions in your plant, and make well-planned recommendations that may mean increased production and operating economies. No obligation. Write us today.



Removable Box Units with Corner Stacking Brackets

Box can be stacked on platforms to any practical height. Sections are easily removed and material is always within a few inches of the top. Corner stacking brackets which fit over the corner of the platform or box, are securely welded to the bottom corners of each box section and are designed to permit rapid and secure assembly.



Box and Platform Units with Tiering Lugs

Truscon units provided with tiering lugs securely welded to the top of each box, as illustrated, give greater box capacity because boxes can be the full width of the platform. Standard units, with or without channel runner, are available.

Investigate TRUSCON Foundry Flasks

Light weight . . . durability . . . strength where strength is needed . . . easily rammed and shaken out . . . these are features of economy and production you get in TRUSCON foundry flasks.

Write for descriptive literature on complete line.

Truscon

MATERIALS HANDLING EQUIPMENT

Truscon Steel Co., Pressed Steel Division, 6100 Truscon Avenue, Cleveland, Ohio. Subsidiary of Republic Steel Corporation.

YOU'LL FIND IT WILL PAY TO TRUSCONVEY YOUR PLANT MATERIALS

Fatigue Cracks BY A. H. DIX

Thank You, Thank You

• • • Before you lies the result of thousands of hours of work on the part of the brains department. If, as we expect, your cries of "Author! Author!" bring the editors out of the wings, we suggest that they drag with them the other half of the act, the men who wrote the advertising in this issue.

Between them, the editors and advertisers have fashioned a perfect thing, and with hand cupped to our good ear like Uncas in "The Last of the Mohicans," we await your cheers. . . .

Department of the Interior

• • • Speaking of the stage, it was just about a year ago that we plugged Ethel Merman's line in *Panama Hattie,* "All the same I'm in the pink, my constitution's made of zinc." *Hattie* is shelved, but if she is revived a substitute material for her innards will obviously have to be found. We suggest, "All the same I'm feeling spastic, my constitution's made of plastic."

She Scoffs at Their History

• • • The Bell System's headline, "General Jackson didn't know the war was over" draws fire from Mrs. Harvey C. Garber, president of the Stitt Ignition Co., Columbus, Ohio, spark plug manufacturer. The ad reads, "Messages traveled slowly in 1815 . . . the Battle of New Orleans was fought *fifteen days after peace had been signed!*"

She says this is a mis-statement and sends us a book about it. The book says the battle was fought 127 years ago next week, Jan. 8, 1815; the peace treaty was signed in Ghent on Dec. 24, 1814, but was not to be effective until ratified by both sides. It was ratified Feb. 18.

The point Mrs. Garber brings up is a delicate one, and we would like to get ourselves out of the line of fire, as we can barely keep up with things on the Far Eastern, Russian and Libyan fronts. So we will crawl into our bomb shelter and let her shoot it out with the Bell System.

Production Expert

You might be interested in knowing that Henry Shrapnel, then a lieutenant, got the idea while watching a two-hour bombardment of troops with solid shot, during which something like two men were killed. The boys just opened ranks and let the grounders bounce past. His invention made him a general.

Besides the 191 .36 balls in the old 3-in. shrapnel, do not forget that there is a brass nosecap fuze weighing about a pound which sprays right along with the balls in the "cone of dispersion." There is also a 3-in. cast iron cylinder which originally contained the above; its forward progress is neutralized by the force of the shrapnel bursting charge, so it drops straight down. But it does no one good to be conked therewith, believe me.

—*Deac*

Honey and Vinegar

• • • A combination rap and caress is given us by the Pittsburgh *Bulletin Index*:

Error sullied the usually clean, well-written pages of the nation's steel journal Iron Age recently, provided a chuckle for a few knowing Pittsburghers. Under the heading "World's Largest Casting," Iron Age said the record for producing the largest casting is apparently held by the Bethlehem Steel Co., with a 230 ton casting . . ."

The *Bulletin Index* gives the honor to the Mesta Machine Co. for a 300-ton casting produced recently in Homestead. Which is another reason why it is dangerous to declare in print that anything is the oldest, biggest, dumbest, slowest, ugliest, or otherwise superlative. For someone is almost certain to claim you are wrong, and what is worse, prove it.

Priorities Are Funny, Ha Ha

• • • Which reminds us to tell you that on Rudy Vallee's radio program the other night someone remarked on John Barrymore's anemic appearance. The great profile remarked that there was nothing the matter with him that a little iron wouldn't cure. "To get as much iron as you need," was the retort, "you'll have to get a priority."

One of Our Boys Made It

• • • We hope that those who look down at trade papers as the Jeeter Lesters of the Fourth Estate will take note of a new book, "College Readings for Inductive Study." For in this 605-page collection of literature's perfect blue white is a gem cut by a trade paper editor.

The trade paper editor is John H. Van Deventer, and the particular editorial memorialized is "Who Will Tear Down the Fences?" originally published in the issue of June 16, 1938. It concerns the removal of barriers as a means of eliminating class conflicts.

Among others whose works are in this book, which is required reading in many colleges, are Walter Pater, Thomas Carlyle, Lin Yutang, Brander Matthews, Walter Lippmann, Louis Untermeyer, Hugh Walpole, H. G. Wells, and John Keats.

For this honor we rejoice in the name of the trade press, despite the yawns of the immortals' companion, whose editorials are frequently reprinted to the tune of hundreds of thousands and whose page is undoubtedly the trade press' most widely read feature.

Donne Was Good, Too

• • • Another piece of writing we have always admired is one that Ernest Hemingway used as a foreword in "For Whom the Bell Tolls." The temptation to quote it overpowers us, so here goes:

No man is an *Iland*, intire of it selfe; every man is a peece of the *Continent*, a part of the maine; if a *Clod* bee washed away by the *Sea, Europe* is the lesse, as well as if a *Promontoria* were, as well as if a *Mannor* of thy *friends* or of *thine owne* were; any man's *death* diminishe me, because I am involved in *Mankinde*; And therefore never send to know for whom the *bell* tolls; It tolls for thee.

—**John Donne**

• • • *never send to know for whom the bell tolls; it tolls for thee.* Thirteen words that sing.

This Is the Way He Heard It

Donald Nelson's crack about the three sides to a story differs in one important particular from a version I heard more than thirty years ago—"your side, my side, and the *right* side." I got it from a Southern store porch humorist, and judge it to have been born in South, where a nice distinction between "the right side" and "the truth" (as in Nelson's version) can save you a lot of trouble.

—*Edward A. Wieck*

Puzzles

Walter (Babcock & Wilcox) Andresen who takes the blame for last week's problem says that the weight on the beam was 150 lb. while the man was pulling himself up, but as soon as he tied the rope to the railing, the pull on the beam became 300 lb., causing it to break. This does not sound kosher to us but before coming right out and saying so we are waiting for words from the master minds.

Meantime, you might toy with this test of your ratiocinative powers, sent in by E. J. Baker, Jr.:

Traditionally sea cooks serve plum duff on holidays and Sundays. On a yacht sailing North of the Fijis plum duff is served to the crew on Dec. 25, the next day, and the following day. On what days of the week did this sequence occur and in which direction was the yacht sailing?

Happy New Year!

Heating textbooks will have to be rewritten!

A BASIC HEATING PRINCIPLE HAS BEEN EXPLODED!

For years textbooks and heating authorities said it couldn't be done . . . but it is being done!

In Iowa, one of the new Lindberg units requiring a space 6-feet wide by 10-feet long replaced eight older furnaces which took up a space 45-feet by 7-feet . . . . and turned out as much work in 8 hours as the eight older furnaces did in 16 hours!

REDUCED STRAIGHTENING!

In Chicago, the new Lindberg heating principle cut straightening operations on worm gears from 95% requiring straightening to less than 2%.

HANDLED TOUGH JOB PERFECTLY!

On another Chicago installation a complicated armament part which no equipment had ever been able to handle without serious distortion, has been heat treated for months by means of the new Lindberg heating principle without a trace of distortion.

PROVED IN 97 INSTALLATIONS

It's brand new, this Lindberg development . . . but, like all previous Lindberg developments, it's been blasting away old heating theories . . . not in one installation, not two, not ten, not fifty but in 97 *installations from coast to coast* made during the past year.

Like the Cyclone Tempering Furnace that preceded it 7 years ago . . . . like Tubulaire Heating Elements 5 years ago . . . . like Hydryzing at the '38 Metal Show in Detroit . . . this new Lindberg development has gone through the required Lindberg probationary period of 1 year under heavy, 24-hour a day production conditions. From the very first day of operation it has completely upset old heating theories.

LINDBERG ENGINEERING COMPANY

2452 WEST HUBBARD STREET, CHICAGO

Literature, photographs and case histories are being prepared now. They will be ready February 1st. Watch this magazine for complete details.

LINDBERG FURNACES

Dear Editor:

SUBSTITUTE WANTED

Sir:

The Bureau of Mines has given me your name for information regarding a recent discovery of a substitute for steel. Will you please let me know where such a substitute is available, its price, etc. I will greatly appreciate it if you will let me have this information as quickly as possible.

(MISS) ISABELLE SWANN

City Hall
Greensboro, N. C.

EDITORIALPHILE

Sir:

One of the first things I look for when Iron Age comes to my desk is the page carrying the editorial by Mr. Van Deventer. I have enjoyed reading these so much from issue to issue that I am wondering if you have available a collection of them in pamphlet form. If such is obtainable, I should like to know how I could get it.

R. E. SLAYTON

Eclipse Machine Division
Bendix Aviation Corp.
Elmira, N. Y.

300 COPIES

Sir:

CAN YOU MAIL TODAY 300 COPIES REPRINT IRON AGE PRIORITIES SECTION NO. 2?

M. M. STEINBRUNN

Allegheny Ludlum Steel Corp.
Pittsburgh

PD-3

Sir:

We have been requested by one of our suppliers to furnish form PD-3. We are wondering if you print such a form and if so, will you kindly send us about 25 copies.

C. R. WOLF

New Jersey Silica Sand Co.
Millville, N. J.

● PD-3 is an army and navy preference rating certificate and cannot be reproduced by us. See the department issuing original order or the resident inspector.—ED.

WHAT IS METAPLAST?

Sir:

Would like to inquire about a new process called Metaplast, which you have in an article in the Jan. 2 issue of THE IRON AGE. Would appreciate all the information you could give me.

E. A. DENNER

Kalamazoo Plating Works
Kalamazoo, Mich.

● Metaplast is thoroughly discussed in a series of articles entitled "How to Plate Metals on Non-Metals" published in THE IRON AGE on June 12 and June 19.

MOLTEN IRON BURNS

Sir:

SEEKING ECONOMICAL PRACTICAL FIREPROOFING, ANTI-CHAR TREATMENT IDAHO WHITE PINE BOARDS USED CARRYING FOUNDRY MOLDS. HOT SAND CHARS? MOLTEN IRON BURNS? REFERENCES TO PUBLISHED SOURCES OR BACKGROUND BIBLIOGRAPHY WILL BE APPRECIATED.

EDWARD DIETRICH

Plainville Casting Co.
Plainville, Conn.

● Protexol Corp., Kenilworth, N. J., has done some special work of this type, and considerable information is available.—ED.

PLEASE CANCEL

Sir:

Please cancel our subscription when it expires. Regret this action, but company is closing down due to the inability to obtain material.

Hoffman Steel Co.
Jacksonville, Fla.

BAH TO BELLYACHES

Sir:

I read your journal every week and am much impressed with the seemingly universal opinions expressed by some of the so-called big men. These opinions, etc., are all in very destructive criticism of somebody or other: either "that man at the White House," Madame Perkins, or some other person somewhere. But never do they admit that they can do wrong.

Cannot these men realize that an emergency exists, and that the way to get the job in hand under speed is not to be eternally bellyaching. The selectee does not bellyache—and he is not making any profits. Everybody seems to want all the material he wishes and to hell with the other fellow. The automobile men seem to think that they have a perfect right to very preferential treatment. Why? The public has enough cars which will run. And the used car lots are full of 1940, 1939 and earlier cars which all will provide transportation. So why the great need for new cars in such numbers? In England there are no new cars this year or even last year and yet people there seem to get around. Is it that cars made here are only good for two or three years? Or what is it? Why not eliminate *all* construction of cars for this year? Take the steel and other materials used in the making of cars and get the job of work done which is paramount.

. . . I may not know the score, but it seems to me that there should be *within the steel industry* some sort of plan whereby the natural resources of this country could be exploited economically.

. . . But the steel men, the so-called shrewd big steel men, all refuse to take any interest in this [iron ore in California] information. Why? Are they only interested in their present tie-up and to hell with present world conditions?

. . . There is talk of shortages of essential tungsten. And there are desert rats here in Los Angeles who are running round with their tongues hanging out for some one to take a 50 per cent share in tungsten deposits for amounts from $5,000 up. Why?

. . . The same situation exists in the scrap market. We hear that Lukens and other steel plants will have to shut down soon. The scrap collectors here are not making much of an effort to get scrap. I was in one yard last week and heard an offer from a plant for selected auto material, all stored and marked, $9.00 per long ton.

. . . BAH.

E. G. LLOYD

Riviera Ranch
West Los Angeles, Cal.

P. R. MALLORY GETS CREDIT

Sir:

In my article on rectifiers for electroplating, published Sept. 25, Figs. 22, 23 and 24 on pages 46 and 47 appeared by mistake without due credit. These illustrations were supplied through the courtesy of P. R. Mallory & Co., Indianapolis, manufacturers of magnesium-copper sulphide rectifiers.

ADOLPH BREGMAN

Consulting Engineer
New York, N. Y.

DATA FOR DEFENSE

Sir:

Would it be possible to obtain your data on Spotwelding Aluminum, and How to Make Aircraft Stampings Economically? We could use this material for illustrative purposes in our defense class.

JOHN F. DOBKOWSKI

Aero Division, Carstens School
Detroit, Mich.

● See the two-part article, "Job Lot Aircraft Stampings," in the Oct. 19 and 26, 1939, issues of THE IRON AGE, and for the spot welding of aluminum see articles in the Mar. 21, 1940, Apr. 18, 1940, and the Apr. 3, 1941, issues.—Ed.

FINISH OR SUPER-FINISH

Sir:

I saw an article several weeks ago . . . and would appreciate it if you could trace it for me. The article described experiments being performed on different classes of finish for automotive bearings. In other words, the super-finish as performed by Chrysler for the past two or three years has been considered the best, but these experiments are trying to prove this theory wrong and a different type finish is superior.

D. WYMAN

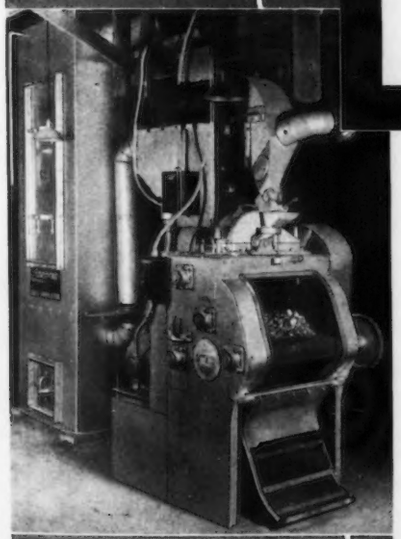
Continental Roll & Steel Foundry Co.
East Chicago, Ind.

● It's a Chrysler-Buick difference of opinion. A detailed story is scheduled for Jan. 8 in THE IRON AGE.—Ed.

WHEELABRATING BRINGS YOU THESE BIG ADVANTAGES in METAL CLEANING and FINISHING

BUSY times like these call for fast production. But whirring wheels are no indication of efficiency. A machine can be very business-like about a slow-down. And that is a vicious thing. You can't tolerate it today because tie-ups are fatal to production speed and profit. Metal cleaning and finishing equipment is a frequent offender on this score. Whether it is a problem to be reckoned with in your plant can be determined only by a comparative test. That is why we urge you to investigate WHEELABRATOR airless abrasive blasting, the modern speed-cleaning process used in more than 1300 plants.

WHEELABRATING GIVES YOU:



15" x 20" WHEELABRATOR Tumblast Installed at Algonac Foundry Co., Algonac, Michigan.

1 HIGH SPEED CLEANING — Reduces costs; speeds up shipment of orders.

2 CUTS CLEANING COSTS up to 50% and more — because it is faster; saves power up to 80%; saves labor; saves time in loading and unloading; saves space; saves abrasive; saves on operating and maintenance costs.

3 REMOVES ALL TRACE OF SAND AND SCALE down to the virgin metal, with the result that:
- — Machining and grinding are faster.
- — Tools last longer.
- — Inspection is simplified.
- — Hardness readings are accurate.

4 IMPROVED APPEARANCE — Wheelabrated products are bright, silvery, and uniformly clean.

5 PROVIDES PERFECT BOND for final finishing such as: enameling, plating, galvanizing, painting, etc.

6 PRODUCES WIDE RANGE OF FINISHES from fine to coarse.

7 HANDLES WIDE RANGE OF WORK — from fine springs to heavy armor plate. Ideal for special and unusual applications.

8 ELIMINATES CHIPPED AND ROUNDED CORNERS — only a minimum amount of stock needed for finish machining.

EQUIPMENT AVAILABLE

TUMBLASTS — Made in seven sizes (1 cu. ft. to 30 cu. ft.) for cleaning pieces from a fraction of an ounce up to hundreds of pounds each.

TABLASTS — designed for cleaning flat, fragile, or odd shaped work. Made in standard and special sizes.

SPECIAL CABINETS—designed to clean large, heavy or unusual jobs that require special handling.

TRADE MARK

THE AMERICAN MOLDER

AMERICAN FOUNDRY EQUIPMENT CO.

510 S. BYRKIT ST. MISHAWAKA, IND.

This Industrial Week . . .

° ° °

HOLIDAY shutdowns in steel producing and consuming plants with war orders meant little loss in production in the last seven days, a period which in normal years sees a substantial decline.

Industry in the U. S. already has reached a point in the war program where vacations are something to look forward to, not something to be enjoyed now.

70% Output Gain Called Not Enough

In Ohio, one industrialist expressed dissatisfaction that his plant had not been able to do better than increase its 1941 output by 70 per cent, a gain he told his officials and employees, that was not "nearly enough."

In the steel producing industry, output has advanced to 96.5 per cent of capacity but the gain was only three points because of the unusually strong mill schedules prevailing in the Christmas week.

Operations in the Pittsburgh area are up nine points to 97 per cent this week, equaling the preholiday level. Chicago is off two points to 101.5 while Youngstown is up seven points to 95 per cent. Philadelphia is reported at 90 per cent this week, Cleveland at 99, Buffalo at 92.5, Wheeling at 86, Birmingham at 95.5, Detroit at 106, South Ohio River at 108, Western at 97, St. Louis at 75, and Eastern at 107.

OPM Offers New Plan for Non-War Plants

Among recent developments hopeful to many idle or near idle non-war metal plants is the OPM Contract Distribution Service Division plan for a broad scale conversion of 15 industries to war production. This branch of the OPM expects to see air conditioning equipment makers produce $481 million of fuel tanks, engine cowlings, small compressors, fuse cylinders, mine sinkers, engine castings, bomb components, smoke shells and other war items.

Farm implement makers are slated to manufacture $231 million of tanks, the stove industry $125 million of airplane parts, shell casings, smoke bombs, land mines, the office machinery plants $90 million of rifle and pistol components, and the metal furniture industry $76 million of airplane fins, rudders, boilers, bombs, ammunition boxes.

These are examples of industries which, according to the OPM Contract Distribution Office, must be brought into the war program. How the necessary metals for use of such industries can be diverted from the already well established war industry plants remains to be worked out but some observers see a very large part of the so-called non-defense plants making war goods before the nation's war program reached victory levels.

Many metal plants are going into 1942 with great backlogs of which nearly all carry priority ratings, intended for direct or indirect war use.

$74.4 Billion Authorized

Some understanding of the immensity of the war program may be gained by a glance at the financial side of America's war effort. On Dec. 15, the latest date for which such figures are available, the government had authorized the expenditure of $16.6 billions for ordnance, of $13.2 billions for airplanes, parts and accessories, and $8.8 billions for naval ships. A total of $8.2 billions had been authorized for industrial facilities, $5.6 billions for other munitions and supplies, and $4.7 billions for stockpiles and miscellaneous lend-lease exports.

The total expenditure authorized for war at mid-December was $74.4 billion, of which $47.7 billion in contracts has already been awarded.

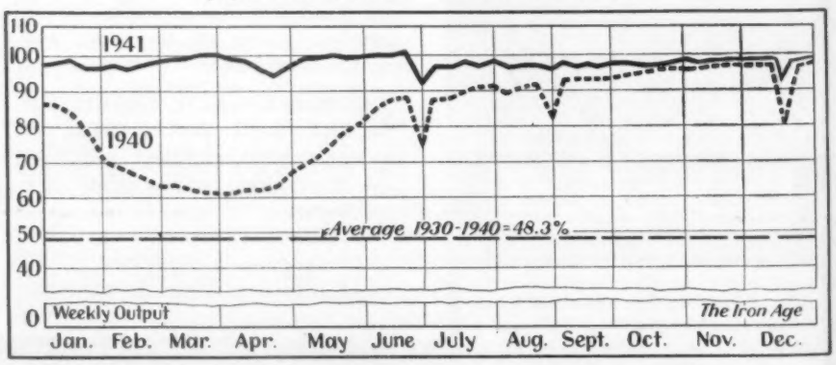
Problem Remains of Getting Materials

In this great war program the steel producing and consuming industries on whom most of the burden falls are everywhere accepting their responsibilities. It is expected that terrific pressure in production and distribution will now be directed toward Army, Navy, Maritime Commission and lend-lease requirements. Even though the war needs of the U. S. pyramid day by day, industry sees no letdown in the meeting of lend-lease requirements for the country's allies.

In the distribution of steel supplies into channels expediting the production of war materials, industry expects necessity more than ever to be the mother of invention. Some steel companies making steel ingots and slabs may find some of this material ordered by OPM to be sent to other steel companies where it will be fabricated into plates and other highly rated ma-

Steel Ingot Production—Per Cent of Capacity

(Open Hearth, Bessemer and Electric Ingots)



Steel Ingot Production, by Districts—Per Cent of Capacity

	Pitts-burgh	Chi-cago	Youngs-town	Phila-delphia	Cleve-land	Buf-falo	Wheel-ing	De-troit	South-ern	S.Ohio River	West-ern	St. Louis	East-ern	Aggre-gate
Current Week.....	97.0	101.5	95.0	90.0	99.0	92.5	86.0	106.0	95.5	108.0	97.0	75.0	107.0	96.5
Previous Week.....	88.0	103.5	88.0	89.0	99.5	90.0	82.0	107.5	95.5	103.0*	95.0	94.0	104.0	93.5

* Revised

terial. The allocation of scrap will be made on the basis of how important it is to get out specific rush steel orders.

Pacific Repairs a Structural Factor

It is now clear that the substantial increase in construction activity for new and other bases along the Pacific Coast, coupled with repair needs in the Far East, will keep structural mills at an all-out production level for some time to come. All of this "heavy steel" activity means that the OPM will make allocations for munitions steel, heavy rails and all other material which is necessary to carry on under a war economy. Some non-defense consumers appear to be facing idleness for months to come and tonnage with lower priority ratings will frequently be interfered with by the more urgent allocations. More than ever the steel and allied industries must demonstrate their adaptability to swift changes in demand which, this time, may involve the nation's security at various points of attack.

February Pig Iron Allocations May Change

How the many-phased priority and allocation system is operating continues, as 1942 begins, to be a question mark. Pig iron allocations for January are generally regarded as satisfactory, although there is a strong feeling in the Mid-West that February allocations may be changed radically. Continued interference with steel operations resulting from shortages of scrap is believed by some observers to be paving the way for diversion of the output of merchant iron by steel producers to their own furnaces. Such a step may be taken if the scrap situation does not improve.

Another restrictive order involving tin plate is expected to be promulgated soon. It is expected that control of tin plate production may be sought through the allocation of pig tin to steel companies making tin plate rather than through an elaborate control setup for tin plate production schedules. With less pig tin available, tin plate output will automatically drop.

Some steel producers believe that allocations of cold drawn steel will be withheld until after the beginning of the second quarter, permitting producers with large backlogs of high priority orders to clear their mills before their production is allocated.

Price developments came fast in the last few days. The OPA has begun a review of all maximum price schedules and informal price agreements it has issued, to bring them into conformity with the standards contained in the price control bill now pending in Congress. No major advances are likely to be required in ceilings established on non-agricultural commodities. (Price ceilings of important metal industry products appear elsewhere in this issue of THE IRON AGE.)

Scrap Consumption Tops 59 Million Tons

Results of the new iron and steel scrap price schedule, which segregates grades according to their uses, cannot be accurately weighed so far. For several weeks prior to announcement of the new schedule, scrap collections fell off slightly. The new schedule recognizes overgrading evils, defines electric furnace grades and prevents their use in open hearths, and permits dealers to make use of the "most favorable" basing point. The sharpest changes occur in cast iron scrap.

Total scrap consumption in 1941 (December estimated) far exceeded any other year at 59.6 million net tons, the Institute of Scrap Iron & Steel reported in a year-end statement. Of the tonnage melted in 1941 an estimated 27.4 million tons was purchased scrap. Scrap inventories during the year declined 1.84 million tons.

Labor developments included the brushing off by President Roosevelt of industry's strong effort to bar the open shop as an issue as long as the war emergency lasts. While the recent labor-management conference resulted in an agreement on "no strikes and lockouts" settlement of all disputes by peaceful means and creation of a war labor board to handle disputes, organized labor remains free to institute a campaign for the closed shop. Failure of the conference to freeze labor relations, thus postponing controversies over the closed shop until after the war, may result in difficulties.

In a decision which would have received far greater attention in pre-war days, the Supreme Court has ruled that employers may—if they do not go too far—make anti-union speeches and issue anti-union literature without violating the Wagner Act. The high court said, however, that the National Labor Relations Board may consider what an employer says as well as what he does otherwise in determining whether there was interference with the rights of employees to self-organization.

Stoppage of tin imports because of war developments in the Pacific has forced OPM's priorities division to prepare tighter restrictions on this material. As a result, the lead and tin foil order L-25, which was to become effective on Dec. 24, has been held up pending completion of a new tin limitation order.

In an important overhauling of Priorities Regulation No. 1, the OPM has made changes intended to increase its effectiveness. One throws into the mandatory class all "B" ratings for essential civilian orders. Producers are now required to accept all orders bearing a priority rating in preference to any unrated order. Heretofore acceptance of the "B" rated orders, unlike A ratings of defense, was not compulsory.

Other changes in Priorities Regulation No. 1 assign an A-10 rating to all defense orders not otherwise rated, provide a stricter limitation of inventories by forbidding acceptance of delivery of materials for inventory in excess of a practicable working minimum, and bar except by permission of the priorities director any alteration of material if it increases inventory beyond this minimum.

Required acceptance of "B" rated orders is regarded as a further transitional step toward allocation of scarce materials, since "B" ratings are one method of designating the relative importance of civilian uses for materials after war requirements have been met.

Structural steel awards of 7400 tons compare with 5130 tons last week while new structural steel projects call for 19,500 tons against 19,910 tons a week ago. Outstanding awards for the week include 2800 tons for an airplane repair plant, 1316 tons for a seaplane hangar and 1000 tons for a machine shop and foundry. Largest new structural steel projects are 7000 to 8000 tons for an aluminum rolling mill and 2000 to 3000 tons for an alminum extrusion plant.

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W	5.00	— 6.00
Mo	4.00	— 5.00
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News of Industry

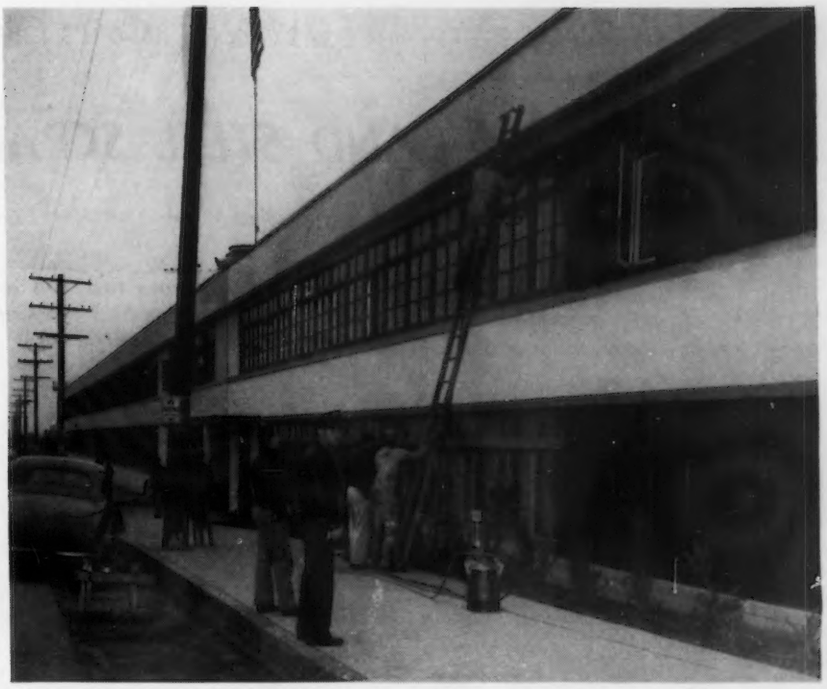

Photo by Wide World

THIS ISN'T PRACTICE: Black paint was sprayed on this airplane plant at Burbank, Cal., following the Japanese attack on Pearl Harbor. The paint is a flat, black, no gloss type.

Tower Hails 1941 for Accomplishments

• • • **For the steel industry,** 1941 was a year of historic accomplishment, says Walter S. Tower, president, American Iron & Steel Institute, in a review issued Dec. 30.

"Under the impetus of the approaching war emergency, American steel companies produced over 82,800,000 net tons of steel, or approximately 25 per cent more than had ever before been made in one year," he said. "The previous record was 67,000,000 tons in 1940.

"The record achieved in 1941 stands out in its full stature against the background of recurring strikes and slow-downs in coal mines and steel plants, and of shortages which developed in certain raw materials, such as scrap steel. Those developments beyond any doubt caused a loss in production running toward, if not beyond, a million tons of steel.

"The industry had been functioning for many months on the basis of a 24-hour day and a seven-day week. Its leaders had long ago accepted as their primary task the fulfillment of all defense needs, as long as our security and freedom are threatened by hostile nations. For those reasons, the steel industry has quickly and smoothly placed itself on a wartime basis.

"Our productive capacity, at the beginning of 1942, stands at approximately 88,000,000 net tons. That would certainly leave a very large tonnage of steel available for indirect defense and civilian needs, but how greatly the total will be affected by active warfare is still not clear.

"The foresight of leaders of the steel industry in expanding steelmaking capacity by 15,000,000 tons, or 20 per cent, since 1929 has proved invaluable during the defense emergency and will have incalculable importance as the war progresses.

"According to plans already accepted, steel capacity is currently being expanded still further to over 90,000,000 tons annually. It is apparent, however, that such an amount of steel capacity cannot be fully employed until some time in 1944, because of shortage in supply of scrap steel, the need for more blast furnaces to compensate for that shortage, and for facilities for transporting from the mines to the blast furnaces the greatly increased tonnages of iron ore that will be required."

Non-ferrous Exports of Canada Show Sharp Gain

Toronto

• • • **Canada's exports** of non-ferrous metals (excluding gold) during November were valued at $23,425,000 which brings cumulative exports for such metals to $225,240,000 for the first 11 months of the year, an increase of almost $45,000,000 over the 1940 period and $55,000,000 over 1939. Total for all of 1940 was $194,712,000, which was slightly under the $194,876 established in the record year 1937. Sharply higher figures are foreshadowed for 1942.

Chicago Pig Iron Output Climbing

Chicago

• • • **Both pig iron production** and freight carloadings in this area were up in November over the same month of 1940. Carloadings amounted to 217,206 cars, up 6.92 per cent; and pig iron production, despite fewer working days and a captive coal mine strike, aggregated 976,133 tons, or a gain of 6.10 per cent over November, 1940.

IRON AND STEEL SCRAP PRICES

Revised to Dec. 23, 1941

(All the prices given below are per gross ton and are basing point prices from which shipping point prices and consumer's delivered prices are to be computed)

OTHER THAN RAILROAD SCRAP

	Open Hearth Grades (No. 1 Heavy Melting; No. 1 Hydr. Compressed Black Sheets; No. 2 Heavy Melting; Dealers' No. 1 Bundles; Dealers' No. 2 Bundles; No. 1 Busheling)	Machine Shop Turnings	Blast Furnace Grades (Mixed Borings and Turnings; Shovelling Turnings; No. 2 Busheling; Cast Iron Borings)	ELECTRIC FURNACE AND FOUNDRY GRADES											
				Low Phos.			Heavy Structural and Plate			Cut Auto. Steel Scrap			Alloy free Low Phos. and Sulphur Turnings	Heavy Axle and Forge Turn. First Cut	Electric Furnace Bundles
				Billet, Bloom, Forge Crops	Bar Crops and Smaller	Punchings and Plate	3 ft. and Under	2 ft. and Under	1 ft. and Under	3 ft. and Under	2 ft. and Under	1 ft. and Under			
Pittsburgh, Brackenridge, Butler, Monessen, Midland, Johnstown, Sharon, Canton, Steubenville, Warren, Youngstown, Weirton	$20.00	$16.00	$16.00	$25.00	$22.50	$22.50	$21.00	$21.50	$22.00	$20.00	$20.50	$21.00	$18.00	$19.50	$21.00
Cleveland, Middletown, Cincinnati, Portsmouth	19.50	15.50	15.50	24.50	22.00	22.00	20.50	21.00	21.50	19.50	20.00	20.50	17.50	19.00	20.50
Chicago, Claymont, Coatesville, Conshohocken, Harrisburg, Phoenixville, Sparrows Pt.	18.75	14.75	14.75	23.75	21.25	21.25	19.75	20.25	20.75	18.75	19.25	19.75	16.75	18.25	19.75
Ashland, Ky.	19.50	15.50	15.50	24.50	22.00	22.00	20.50	21.00	21.50	19.50	20.00	20.50	17.50	19.00	20.50
Buffalo, N. Y.	19.25	15.25	15.25	24.25	21.75	21.75	20.25	20.75	21.25	19.25	19.75	20.25	17.25	18.75	20.25
Bethlehem, Pa.; Kokomo, Ind.	18.25	14.25	14.25	23.25	20.75	20.75	19.25	19.75	20.25	18.25	18.75	19.25	16.25	17.75	19.25
Duluth, Minn.	18.00	14.00	14.00	23.00	20.50	20.50	19.00	19.50	20.00	18.00	18.50	19.00	16.00	17.50	19.00
Detroit, Mich.	17.85	13.85	13.85	22.85	20.35	20.35	18.85	19.35	19.85	17.85	18.35	18.85	15.85	17.35	18.85
Toledo, Ohio	.....	13.85	13.85	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Louis, Mo.	17.50	13.50	13.50	22.50	22.00	20.00	18.50	19.00	19.50	17.50	18.00	18.50	15.50	17.00	18.50
Atlanta, Ga.; Alabama City, Ala.; Birmingham, Los Angeles; Pittsburg, Cal.; San Francisco	17.00	13.00	13.00	22.00	19.50	19.50	18.00	18.50	19.00	17.00	17.50	18.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	12.50	12.50	21.50	19.00	19.00	17.50	18.00	18.50	16.50	17.00	17.50	14.50	16.00	17.50
Seattle, Wash.	14.50	10.50	10.50	19.50	17.00	17.00	15.50	16.00	16.50	14.50	15.00	15.50	12.50	14.00	15.50
Portland, Ore.	.....	.....	.....	.....	15.50	15.50	14.00	14.50	15.00	13.00	13.50	14.00	11.00	12.50	14.00

Pittsburgh basing point includes switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport. Cincinnati basing point includes Newport, Ky., switching district. St. Louis includes switching districts of Granite City, East St. Louis, Madison, Ill. San Francisco includes switching districts of South San Francisco, Niles and Oakland, Cal.

Maximum prices of inferior grades shall continue to bear same differential below corresponding grades as existed during the period Sept. 1, 1940, to Jan. 31, 1941. Superior grades cannot be sold at a premium without approval of OPA. Special preparation charges in excess of the above prices are banned. Whenever any electric furnace or foundry grades are purchased for open hearth or blast furnace use, prices may not exceed the prices above for the corresponding open hearth grades.

MOST FAVORABLE BASING POINT—This is the basing point, which when used to compute the shipping point price, as defined below, will yield the highest shipping point price.

MAXIMUM SHIPPING POINT PRICE—Where shipment is by rail or vessel, or by combination of rail and vessel, the scrap is at its shipping point when placed f.o.b. railroad car or f.a.s. vessel. In such cases, the maximum shipping point prices shall be: (a) For shipping points located within a basing point, the price listed in the table above for the scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point and (b) for shipping points located outside the basing point, the price in table above at the most favorable basing point minus the lowest transportation charge by rail or water or combination thereof. Published dock charges prevail, or if unpublished 75c. per ton must be included as part of the deduction. Shipping by motor vehicle: The scrap is at its shipping point when loaded. For shipping points located within basing points, take price listed in table minus lowest switching charge. If located outside a basing point, the price at the most favorable basing point minus lowest established charge for transporting by common carrier. If no established transportation rate exists, the customary costs are taken for purposes of deducting.

Exceptions:

(1) At all shipping points with the exception of the State of Washington, the maximum shipping point price of No. 1 Heavy Melting Steel Scrap (with St. Louis price differentials for other grades) need not fall below $13 per gross ton. In Tampa, Pensacola, Fla., Gulfport, Miss., Mobile, Ala., New Orleans, Lake Charles, La., Port Arthur, Beaumont, Galveston, Texas City, Houston and Corpus Christi, Tex., the maximum shipping point price need not fall below $14.00 per gross ton for No. 1 Heavy Melting Steel Scrap (with St. Louis price differentials for the other grades).

(2) Maximum shipping point prices at any New England shipping point shall be computed from the Johnstown, Pa., basing point prices rather than from the prices at the most favorable basing point.

(3) Maximum shipping point prices at any shipping point in New York City, Brooklyn, N. Y., and New Jersey, which by reason of vessel rates have Buffalo or Sparrows Point as their most favorable basing point shall be computed from the prices at the Bethlehem, Pa., basing point rather than the prices at Buffalo or Sparrows Point.

(4) The maximum shipping point price within the Cincinnati basing point shall be the Cincinnati basing point price minus 80 cents per gross ton.

REMOTE SCRAP: Defined as all grades of scrap listed in table above (exclusive of railroad scrap) located in Florida, Montana, Idaho, Wyoming, Nevada, Arizona, New Mexico, Texas, Oklahoma, Oregon and Utah. The delivered price of remote scrap may exceed by more than $1, but not more than $5, the price at the basing point nearest the consumer's plant, provided detailed statement under oath is furnished OPA. Where delivered price would exceed by more than $5 the price at basing point nearest consumer, user must apply to OPA for permission to absorb the additional charges. *Exceptions:*

Where scrap is shipped by vessel from Duluth or Superior to consumers located in Buffalo, New York, Elyria, Cleveland or Saginaw the delivered price shall not be limited to $1 in excess of the price at the basing point nearest the consumer's plant.

In computing the delivered price of billet, bloom and forge crops originating in and shipped from the Pittsburgh basing point, maximum transportation charges which may be added are $2.50.

Delivered price of low phos. and sulphur punchings and plate scrap, low phos. and sulphur bar crops and smaller, alloy free low phos. and sulphur turnings, and first cut heavy axle and forge turnings produced in industrial plants in Michigan and shipped directly to consumers located in or nearest, in terms of established transportation charges, to the Pittsburgh, Brackenridge, or Midland, Pa., basing points, shall not exceed by more than $2.75 the price at the basing point nearest the consumer.

Unprepared Scrap: The maximum prices established hereinabove are maximum prices for prepared scrap. For unprepared scrap, maximum prices shall be $2.50 less than the maximum prices for the corresponding grade or grades of prepared scrap. In no case, however, shall electric furnace and foundry grades be used as the "corresponding grade or grades of prepared scrap."

Where scrap is to undergo preparation prior to its arrival at the point of delivery, such scrap is not at its shipping point, as that phrase is defined above, until after preparation has been completed.

RAILROAD SCRAP

(Per gross ton, delivered consumers' plants located on line.)

	No. 1 RR Heavy Melting	Scrap Rails	Rails for Rerolling	Scrap Rails: 3 ft. and Under	Scrap Rails: 2 ft. and Under	Scrap Rails: 18 in. and Under
Cleveland, Cincinnati, Ashland, Portsmouth, Middletown	$20.50	$21.50	$23.00	$23.50	$23.75	$24.00
Canton, Pittsburgh, Sharon, Steubenville, Wheeling, Youngstown	21.00	22.00	23.50	24.00	24.25	24.50
Chicago, Philadelphia, Sparrows Pt., Wilmington	19.75	20.75	22.25	22.75	23.00	23.25
Birmingham, Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Buffalo	20.25	21.25	22.75	23.25	23.50	23.75
Detroit	18.85	19.85	21.35	21.85	22.10	22.35
Duluth	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
Kokomo, Ind.	19.25	20.25	21.75	22.25	22.50	22.75
Seattle	15.50	16.50	18.00	18.50	18.75	19.00
St. Louis	18.50	19.50	21.00	21.50	21.75	22.00

Where the railroad originator of the scrap operates in two or more basing points, the highest of the maximum prices established above for such basing points shall be the maximum price of the scrap delivered to the consumer's plant at any point on the railroad's line. The term "rails for rerolling" includes any rails sold for that purpose.

GRADES NOT LISTED: Prices shall not exceed average obtained by the railroad from Sept. 1, 1940, through Jan. 31, 1941.

DELIVERED TO CONSUMERS OFF LINE OF ORIGIN: The maximum price is either of the following, whichever is greater (a) the maximum for one-line delivery, or if consumer has been served in past by same source, this maximum plus transportation charge of not more than $2 per ton for rerolling rails, axles and other rerolling scrap, and not more than $1 for all other grades, or (b) the prices listed in the table for the basing point nearest the consumer's plant. Exceptions: for scrap shipped by vessels from Duluth or Superior to consumers in Buffalo, Elyria, Cleveland or Saginaw the maximum delivered price is the maximum in the table plus transportation from railroad's line.

CAST IRON SCRAP

Other Than Railroad Scrap

	Group A	Group B	Group C
No. 1 cupola cast	$18.00	$19.00	$20.00
No. 1 machinery cast, drop broken, 150 lbs. & under	18.00	19.00	20.00
Clean auto cast	18.00	19.00	20.00
Stove plate	14.00	15.00	16.00
Heavy breakable cast	16.50	17.50	18.50
Charging box size cast	17.25	18.25	19.25

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.

Group C includes all states not named in groups A and B.

UNPREPARED CAST IRON SCRAP—Except for heavy breakable cast, unprepared scrap is given a price ceiling of $2.50 per ton less than the maximum prices for the corresponding grade and prepared cast iron scrap. Where scrap is to undergo preparation prior to arrival at the point of delivery, such scrap is not considered at shipping point until preparation is completed.

Consumers of cast scrap may pay the shipping point price plus established charge for transporting the scrap to their plants. In the case of deliveries by truck, the cast scrap buyer must obtain from the seller a certification, made out to OPA, of the shipping point, transportation charges and details of the sale.

COMMISSIONS—None is payable except by a consumer to a broker for brokerage services rendered the consumer, the commission not to exceed 50 cents per gross ton. No commission is payable unless: The broker guarantees the quality and delivery of an agreed tonnage; the scrap is purchased at a price no higher than the maximum allowed; the broker sells the scrap to the consumer at the same price at which he purchased it; the broker does not split the commission with the seller of the scrap; with another broker or sub-broker, or with the consumer. No commission is payable to a person for scrap which he prepares. No person who has not acted as a broker prior to April 3, 1941, is allowed a brokerage commission.

Cast Scrap Changes Arouse Controversy; Broad Aid Doubted

• • • **Appraising the new** iron and steel scrap price schedule which segregates grades according to their uses, market interests early this week reported temporary stimulation of the flow of scrap but were doubtful whether the revisions will bring out over a long period of time any extra material. Hence, the supply problem will remain serious.

For several weeks while the new setup was awaited, collections fell off slightly due to uncertainty. As expected, the new schedule (IRON AGE, Dec. 25, page 99) is a mixture of new benefits and disadvantages. Overgrading evils have been recognized; electric furnace grades are better defined and restricted to prevent their use in open hearths; dealers are permitted to make use of the "most favorable" basing point.

The sharpest changes occur in cast iron scrap, where many grades are now quoted lower, and are completely segregated. Reports from several consumption centers early this week indicated widespread expectations that cast scrap will be harder to get under the new setup on a shipping point basis.

At Cleveland objections were made against the new ceiling for drop broken cast scrap. Dealers said only a short time ago they were receiving $23.50 per ton, plus 50 cents commission. The new ceiling is only $1.50 above the price for steel scrap in the district, and the dealers said it does not warrant the sorting of the scrap and the breaking.

Incorporating many interpretations of the last previous order, the new schedule is expected to be the last reshuffling on such a broad scale for some time.

At Pittsburgh, it was reported the revisions met with general approval. It was pointed out brokers, dealers and steel companies who were reluctant to become parties to overgrading may now legally obtain their share of available supplies. It was said an effort has been made to balance out available supplies into the proper consuming channels. If certain groups obtain more than their relative share under the new price setup, the government has at hand strategic inventory figures as a part of monthly reports which no doubt will be the determining factor in discovering any balance in the distribution of available supplies among the three major consuming groups.

In a year-end statement issued by the Institute of Scrap Iron & Steel, Inc., it is pointed out that total consumption of scrap in 1941 at 59,600,000 net tons (December estimated) far exceeded any previous year. At the same time it was shown that inventories during the year sank 1,841,000 tons. Of the tonnage melted in 1941 an estimated 27,400,000 tons were purchased scrap.

"It is a serious question for the entire defense program whether there will be enough scrap to keep steel mills and foundries operating at the desired capacity rate in 1942," says the Scrap Institute.

•

Dec. 23 Rigid Scrap Deadline

Washington

• • • **OPA announced** Dec. 29 that irrespective of unfilled orders or outstanding contracts, no payments against deliveries of iron and steel scrap made on and after Dec. 23 may be made at prices in excess of those established by the extensive amendment to Price Schedule No. 4 issued on that date. OPA made this statement in response to numerous inquiries.

November Sheet Output Continues Decline; Plates At 123%

• • • **Sheet mill operations** in November showed a further decline, while plate production was maintained substantially above rated capacity, according to the American Iron & Steel Institute's report on the production of steel for sale in November. Sheet mill operations for November were reported at 87.5 per cent of capacity, as compared with 94.1 per cent in October. November plate production was at 122.8 per cent, against 124.1 per cent in the preceding month.

Total production for sale in November, less shipments to the industry for further conversion, was 4,908,646 tons, or 100.1 per cent of capacity, as compared with 5,470,830 tons or 108 per cent in the preceding month.

Output of tin mill products continued at a high pace in November, with hot rolled tin plate production at 100.5 per cent, cold rolled at 93.9 per cent and black plate at 165.1 per cent.

Export production for the month totaled 502,918 tons, against 532,082 tons in October. While ingots, blooms, etc., was still the chief export item in November, production dropped close to 50,000 tons below the October output, while seamless tubing and tin plate produced for export showed sharp rises in November.

AMERICAN IRON AND STEEL INSTITUTE
Capacity and Production for Sale of Iron and Steel Products — November - 1941

		Number of companies	Items	Annual Capacity Net tons	Production for Sale—Net Tons: Current Month: Total	Current Month: Per cent of capacity	Current Month: Shipments: Export	Current Month: Shipments: To members of the industry for conversion into further finished products	Year to Date: Total	Year to Date: Per Cent of capacity	Year to Date: Shipments: Export	Year to Date: Shipments: To members of the industry for conversion into further finished products
STEEL PRODUCTS	Ingots, blooms, billets, slabs, sheet bars, etc.	41	1	xxxxxxx	576,705	xxx	166,032	168,222	6,312,887	xxx	1,787,257	1,903,720
	Heavy structural shapes	9	2	5,248,400	380,873	88.2	11,896	xxxxxxx	4,222,151	87.9	159,701	xxxxxxx
	Steel piling	4	3	422,000	27,528	79.3	1,787	xxxxxxx	322,384	83.5	30,355	xxxxxxx
	Plates—Sheared and Universal	20	4	5,654,360	571,476	122.8	20,958	7,600	5,391,189	104.2	302,931	42,316
	Skelp	8	5	xxxxxxx	73,809	xxx	6,355	33,569	922,287	xxx	140,135	390,690
	Rails—Standard (over 60 lbs.)	4	6	3,613,600	122,588	41.2	13,404	xxxxxxx	1,577,201	47.7	74,633	xxxxxxx
	Light (60 lbs. and under)	6	7	302,800	8,842	35.5	3,182	xxxxxxx	155,645	56.2	53,923	xxxxxxx
	All other (Incl. girder, guard, etc.)	2	8	102,000	3,431	40.9	213	xxxxxxx	26,254	28.1	3,220	xxxxxxx
	Splice bar and tie plates	15	9	1,312,200	40,279	37.3	6,510	xxxxxxx	631,165	52.6	19,221	xxxxxxx
	Bars—Merchant	42	10	xxxxxxx	514,223	xxx	19,517	58,121	5,849,547	xxx	405,767	690,948
	Concrete reinforcing—New billet	20	11	xxxxxxx	144,688	xxx	18,349	xxxxxxx	1,490,245	xxx	194,608	xxxxxxx
	Rerolling	20	12	xxxxxxx	24,504	xxx	3,280	xxxxxxx	234,707	xxx	17,568	xxxxxxx
	Cold finished—Carbon	25	13	xxxxxxx	87,671	xxx	1,629	xxxxxxx	1,138,615	xxx	22,906	xxxxxxx
	Alloy—Hot rolled	17	14	xxxxxxx	152,234	xxx	8,461	22,523	1,720,526	xxx	127,987	252,485
	Cold finished	19	15	xxxxxxx	18,643	xxx	1,516	xxxxxxx	178,285	xxx	26,689	xxxxxxx
	Hoops and baling bands	5	16	xxxxxxx	5,538	xxx	158	xxxxxxx	103,884	xxx	3,677	xxxxxxx
	TOTAL BARS	65	17	13,321,925	947,501	86.4	52,910	80,644	10,715,809	87.9	799,202	943,433
	Tool steel bars (rolled and forged)	16	18	177,550	13,287	91.0	477	xxxxxxx	137,052	84.3	6,817	xxxxxxx
	Pipe and tube—B. W.	15	19	2,092,040	132,482	77.0	7,326	xxxxxxx	1,463,454	76.4	102,611	xxxxxxx
	L. W.	7	20	760,860	33,710	53.8	1,444	xxxxxxx	385,552	55.4	21,796	xxxxxxx
	Electric weld	7	21	1,071,020	54,216	61.5	6,492	xxxxxxx	669,260	68.3	33,960	xxxxxxx
	Seamless	14	22	2,661,160	152,073	69.5	26,545	xxxxxxx	1,775,625	72.9	155,420	xxxxxxx
	Conduit	7	23	156,140	11,388	88.6	422	xxxxxxx	132,099	92.4	4,460	xxxxxxx
	Mechanical Tubing	10	24	399,000	31,394	95.6	1,762	xxxxxxx	318,718	87.3	23,276	xxxxxxx
	Wire rods	22	25	xxxxxxx	114,972	xxx	13,278	19,714	1,377,482	xxx	178,557	229,852
	Wire—Drawn	41	26	2,293,890	189,651	100.5	8,953	1,849	2,123,008	101.1	128,358	20,672
	Nails and staples	18	27	1,153,930	59,658	62.8	5,014	xxxxxxx	724,587	68.6	62,230	xxxxxxx
	Barbed and twisted	16	28	474,210	26,642	68.3	15,448	xxxxxxx	257,249	59.3	74,362	xxxxxxx
	Woven wire fence	16	29	777,785	17,793	27.8	243	xxxxxxx	277,213	38.9	1,989	xxxxxxx
	Bale ties	11	30	110,970	5,496	60.2	277	xxxxxxx	76,147	75.0	572	xxxxxxx
	All other wire products	8	31	62,380	3,406	66.4	84	xxxxxxx	34,148	59.8	1,294	xxxxxxx
	Fence posts	13	32	122,165	3,732	37.1	158	xxxxxxx	62,972	56.3	1,140	xxxxxxx
	Black plate	11	33	340,030	46,196	165.1	5,052	54	416,281	133.8	39,652	97
	Tin plate—Hot rolled	7	34	515,620	42,656	100.5	20,234	xxxxxxx	336,774	71.4	72,830	xxxxxxx
	Cold reduced	11	35	3,622,540	280,002	93.9	53,314	xxxxxxx	2,862,345	86.3	299,937	xxxxxxx
	Sheets—Hot rolled	28	36	xxxxxxx	583,251	xxx	23,378	14,465	6,905,143	xxx	285,930	185,164
	Galvanized	16	37	xxxxxxx	109,577	xxx	5,768	xxxxxxx	1,525,663	xxx	96,917	xxxxxxx
	Cold rolled	18	38	xxxxxxx	210,294	xxx	10,627	xxxxxxx	2,806,854	xxx	77,911	xxxxxxx
	All other	13	39	xxxxxxx	56,327	xxx	1,671	xxxxxxx	705,945	xxx	21,423	xxxxxxx
	TOTAL SHEETS	30	40	13,330,160	959,449	87.5	41,444	14,465	11,943,605	97.9	480,181	185,164
	Strip—Hot rolled	24	41	3,285,430	156,331	57.8	6,864	16,203	1,853,964	61.7	70,699	226,850
	Cold rolled	40	42	1,564,990	100,676	78.2	3,236	xxxxxxx	1,227,224	85.7	24,976	xxxxxxx
	Wheels (car, rolled steel)	5	43	422,820	25,385	73.0	174	xxxxxxx	242,563	62.7	2,327	xxxxxxx
	Axles	7	44	453,470	19,597	52.5	379	xxxxxxx	181,182	43.7	3,584	xxxxxxx
	Track spikes	11	45	325,770	13,255	49.5	1,051	xxxxxxx	156,892	52.6	4,256	xxxxxxx
	All other	7	46	78,600	4,487	69.4	-	xxxxxxx	35,979	50.0	79	xxxxxxx
	TOTAL STEEL PRODUCTS	168	47	xxxxxxx	5,250,966	xxx	502,918	342,320	59,348,347	xxx	5,165,941	3,942,794
	Pig iron, ferro manganese and spiegel	31	48	xxxxxxx	690,455	xxx	14,840	279,818	7,433,316	xxx	463,833	2,537,129
	Ingot moulds	5	49	xxxxxxx	71,976	xxx	947	xxxxxxx	743,774	xxx	5,640	xxxxxxx
IRON PRODUCTS	Bars	13	50	175,915	9,301	64.3	411	770	92,703	57.6	1,401	5,333
	Pipe and tubes	3	51	109,300	6,288	69.9	343	xxxxxxx	64,185	64.2	2,659	xxxxxxx
	All other	2	52	71,000	1,770	30.3	436	-	20,707	31.9	3,840	-
	TOTAL IRON PRODUCTS (ITEMS 50 to 52)	15	53	291,715	17,359	72.3	1,190	770	177,593	66.5	7,900	5,333

Total Number of Companies Included - 193

The estimated average yield of products for sale from ingots produced by the companies included above is 71.1 *%, which applied to their total ingot capacity equal* 89,627,900 *net tons of finished rolled products. Production for sale, less shipments to members of the industry for further conversion, related to the estimated yield is as follows:*

Current month 4,908,646 *N. T.;* 100.1 *%*
Year to date 55,405,553 *N. T.;* 101.5 *%*

During 1940, the Companies included above represented 97.5% of the total output of Finished Rolled Products.

OPM Tightens Inventory Control; Clarifies Status of "B" Ratings

Washington

• • • **OPM last week** took additional steps to tighten its control over industrial inventories of strategic materials and at the same time moved closer toward a horizontal system of allocating all scarce materials. These twin moves were embodied in an overhauling of Priorities Regulation No. 1, the keystone of the entire priorities system, which was accomplished in the form of an amendment to the regulation.

One of the more important changes included in the amendment is the placing in the mandatory class of all priority certificates carrying B ratings. Producers must now accept these B ratings, which cover essential civilian needs, before taking an unrated order. Previously, acceptance of B rated orders was not compulsory. Orders carrying an A rating must still be given preference over other ratings, as in the past.

Other changes made in Regulation No. 1 assign a priority rating of A-10 to all war orders not otherwise rated; provide a stricter limitation on inventories by forbidding acceptance or delivery of materials for inventory in excess of a practicable working minimum; bar, except by permission of the Director of Priorities, any alteration of material if it increases inventory beyond this minimum; and prevent receipt of a new, high-rated order from interfering with deliveries on previously accepted lower-rated orders.

OPM said that the required acceptance of B rated orders is a further transitional step toward allocation of scarce materials, since B ratings are one method of designating the relative importance of civilian uses for materials after war requirements have been met.

Giving an A-10 rating to all war orders not otherwise rated is intended, the OPM said, to eliminate any confusion which might arise respecting the handling of those war orders which were previously unrated in relation to other orders which had been specifically rated A-10, the lowest war rating.

In forbidding acceptance of delivery of materials for inventory in excess of a practicable working minimum, the amendment fixes a stricter limitation on the earlier form of the regulation which only forbade producers to increase inventories beyond the amount necessary to meet required deliveries. Now all inventories of any war materials whatever must be reduced to a practicable working minimum, "strictly construed, before they can be replenished." The prohibition applies to suppliers of materials for inventory as well as to producers who maintain inventories, and it covers non-armament as well as armament producers. Inventories of imported materials are excepted.

Barring of alteration of material where the effect is to increase inventories beyond a practicable working minimum, except upon specific authorization of the Director of Priorities, is designed to close a possible loophole in the inventory restriction.

Specifically, the order provides that no material may be fabricated, processed, alloyed or otherwise altered if the producer's inventory of the material in its altered form would be increased beyond the stated minimum.

Non-interference with delivery of previously accepted lower-rated orders by receipt of a new, high rated order is assured unless the new order bears an AA rating or is accompanied by direction from the Director of Priorities. Aside from these exceptions a new, high rated order will not have to be accepted if its acceptance would necessitate preempting material which has already been completed to fill a previously accepted war order which bears a lower rating, or if it would preempt material which is within 15 days of completion. In the event the order is accepted, the producer may not divert material already completed or about to be completed on a previous war order for use in filling the new order.

Another revision provides that only the persons actually participating in any regulation are required to keep records. Previously all persons "affected by any rule, regulation or order" were required to keep records.

Another provision has been expanded so that it now includes penalties for violation of any order or regulation. Originally, penalties were applied only for furnishing false information.

New Priority Order To Aid Oil Industry

• • • A new priority order, to be known as Order P-98, is being prepared to cover the needs of the petroleum industry for materials and equipment, OPM reports. Until Order P-98 is issued, operators in the industry may obtain supplies under the general provisions of the maintenance and repair order, P-100, or by individual applications on form PD-1.

Conservation Order Issued

• • • **Conservation** of steel, nonferrous metals, rubber and other critical materials used in the petroleum industry to accomplish the production of oil with the minimum expenditure of scarce materials, and to avoid the drilling of unnecessary wells, has been ordered by OPM in conservation order M-68.

Every operator is prohibited from acquiring or using materials for production purposes except under specified conditions or by specific authorization from the OPM.

Pittsburgh

• • • **The OPM, which** with the Army and Navy distributes priority ratings, has no idea at the present time how much of the steel backlog tonnage is covered by specific group classification of priority ratings ranging from A-A to A-10, according to information reaching THE IRON AGE. The only

partial exception to this general situation is a recent classification of steel plate rolling mill schedules over a period of from two to three months by priority rating groups. Even this compilation, however, is incomplete since it does not indicate the various tonnages assigned the different priority ratings on steel backlogs which are scheduled for shipment after the period now under study.

It is true that the OPM and the steel industry have compiled statistics showing the distribution of steel backlogs under groups A to H as shown on form PD-73 which cover such classifications as the Army, the Navy, the Maritime Commission, lend-lease, etc. However, this particular study does not give any indication of how much steel tonnage already on order has been assigned A-1-a, A-1-b, A-1-c, and up to A-10.

The lack of such important information is said to have nullified to a great extent some priority ratings which have been issued without any information as to how many had preceded them. Furthermore, it is said that any study of the effect on steel backlogs of priority ratings already issued should also include such queries as to whether plate tonnage is sheared or universal, whether bars are carbon, alloy or cold finished, etc.

Until some concrete information is obtained as to the distribution of various priority rated steel tonnage by actual priority symbol classification, additional granting of priorities is more or less meaningless, according to informed opinion.

Farm Equipment Allocation

• • • **Taking its initial** move toward allocation as applied to a big industry, OPM last Saturday announced a farm equipment program for the Nov. 1, 1941, to Oct. 31, 1942, period calling for 1,793,647 net tons of metals and rubber, of which 1,065,000 tons is steel and 679,607 tons is cast iron. The remainder consists chiefly of nonferrous supplies.

In making the materials available for the manufacture of farm machinery and repair of used equipment, OPM adopted a combination of a limitation order in which priority ratings are used to get tonnages. Preference rating order P-95 and limitation order L-26 were put into effect and preference rating orders P-32 and P-33, under which ratings of B-1 and A-8, respectively, were assigned, were automatically revoked.

An A-3 preference rating was made available for materials necessary to produce machinery to turn out food supplies at the rate of 115 per cent of the 1924-29 level. The program is related to both domestic needs and to foreign requirements under the lend-lease program. Domestic materials for new machinery allotted amounts to 1,123,916 tons, steel representing 686,621 tons and cast iron 405,938 tons. Domestic repair parts comprise 497,112 tons.

THIS WEEK'S

Prices and Priorities

Priorities Regulation No. 1 amended to provide stricter inventory control. Acceptance of B rated orders made mandatory. (OPM: PM1882)

Petroleum industry ordered to conserve use of scarce material in conservation Order M-68 issued Dec. 23. (OPM:T113)

Lead and tin foil order L-25 held in abeyance pending a resurvey of the tin situation. Order would have become effective Dec. 24. (OPM:PM1931)

Steel warehouse order M-21-b amended. Changes deal largely with methods of establishing quarterly quotas. (OPM:T111)

Price ceilings being reviewed with aim of adjusting them to agree with price control bill expected to be passed shortly by Congress. Upward adjustments in non-agricultural commodities believed unlikely, OPA says. (OPA:PM1924)

Automobiles may not be shipped with more than four tires, according to Limitation Order L-2-e, issued Dec. 24. Order also formalizes output quotas for December and January. (OPM:PM1930) Passenger cars, light trucks and their replacement parts sold to specified government and defense agencies and foreign governments excluded from production quotas according to interpretations of orders L-2, L-3 and L-4 issued Dec. 23. (OPM:T110)

Iron and steel scrap price schedule No. 4 amended. Number of major revisions made in method of establishing prices. (OPM:PM1909)

Burlap supply placed under full allocation in order M-47 issued Dec. 22. (OPM:PM1902)

Priority order M-29 covering tungsten extended to June 30, 1942. Supplementary order No. 1 to preference order E-1, covering machine tools, extended indefinitely. (OPM: T107 and T109.) Zinc order M-11 extended to March 31, 1942.

Chromium steel containing more than 4 per cent Cr may be used only for defense work rated A-10 or higher according to order M-21-d issued Dec. 27. (OPM:PM1955)

Leather of all types placed under maximum price ceiling in schedule No. 61 which became effective Dec. 29. (OPA:PM1934)

Privately financed dwellings for which foundations were in placed on Oct. 9 granted priority assistance for obtaining materials in order P-71 issued Dec. 23. (OPM:PM1927)

Synthetic rubber production program to be tripled by SPAB to achieve an annual production of 120,000 tons. (SPAB:SPA23)

Wax sellers requested not to sell above prices prevailing on Dec. 18, pending issuance of a formal price schedule. (OPA:PM1943)

Farm machinery, equipment and parts production granted priority assistance for equipment produced within specific quotas in orders P-95 and L-26. These revoke orders P-32 and P-33. (OPM: PM1950)

Imports of antimony, cadmium, chromium, copper, graphite, kyanite, lead, mercury, rutile, tungsten, vanadium, zinc and zircon to be handled by Metals Reserve Co. after Dec. 28, according to order M-63. (OPM:PM1944)

Punitive action against four more companies for violation of priority regulations anounced by OPM. (OPM:PM1923)

For copies of above announcements address defense agency concerned, at Washington, giving announcement number as shown in parentheses after each paragraph. For example, OPM:PM1500 *means announcement* 1500 *issued by Office of Production Management).*

Revisions For The Iron Age Priorities Guide

• • • **Following revisions and additions are to be made to THE IRON AGE Allocations and Priorities Guide, published Nov. 27.**

Under "Miscellaneous Orders," page 4, add:

Priorities Regulation No. 1, amended (12-23); provides stricter inventory control, makes acceptance of B rated orders mandatory.

Under "M Orders," pages 4 and 5, add:

M-21-a—Amendment No. 2 (12-20), prohibits melting of alloy iron and steel except for orders rated A-10 or higher. Alloys covered are manganese, copper, chromium, molybdenum, nickel, cobalt, tungsten, vanadium.

M-21-b—Amendment No. 2 (12-24), provides new method of establishing quarterly warehouse quotas to adjust for seasonal demands.

M-21-d—Prohibits use of chromium steel with more than 4 per cent Cr except on defense work rated A-10 or better. (12-27). Related form: PD-221.

M-47—Establishes full allocation of burlap (12-22). Related forms: PD-186, PD-188.

M-63—Places control of all imports of following materials in hands of Metals Reserve Co.; antimony, cadmium, chromium, copper, graphite, kyanite, lead, mercury, rutile, tungsten, vanadium, zinc and zircon.

M-68 — Establishes restrictions on use of material for development of new oil and natural gas wells (12-23). Related forms: PD-214a, PD-214b, PD-214c (all to be filed with Office of Petroleum Coordinator).

Under "L Orders," page 4, add:

L-2, L-3, L-4 — Interpretation No. 1 (12-23). Passenger cars, light trucks and their replacement parts excluded from production quotas sold to specified government agencies or foreign nations.

L-2-e—Forbids shipping cars with more than four tires; also formalizes December and January production quotas.

L-26—Establishes quotas for production of farm machinery, equipment and parts. See also P-95.

Under "P Orders," page 3, add:

P-71—Assigns rating of A-10 for privately financed dwellings for which foundations were in place Oct. 9, 1941. (12-23). Related form: PD-135.

Weekly Bookings of Construction Steel

Week Ended →	Dec. 29, 1941	Dec. 22, 1941	Dec. 2, 1941	Dec. 30, 1940	Year to Date 1941	Year to Date 1940
Fabricated structural steel awards	7,400	5,130	14,450	44,260	1,278,000	1,207,070
Fabricated plate awards	625	1,225	0	1,535	141,050	148,735
Sheet steel piling awards	0	0	0	0	26,760	76,135
Reinforcing bar awards	20,400	11,100	6,400	8,620	731,155	484,525
Total letting of Construction Steel	28,425	17,455	20,850	54,415	2,176,965	1,916,465

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AMPCO LITERATURE Available

AMPCO METAL, catalogue 22
Ampcoloy—Industrial Bronzes Catalogue
Ampco-Trode Coated Aluminum Bronze Welding Rod
Ampco Metal in Machine Tools
Ampco Metal in Bushings and Bearings
Ampco Metal in Dies
Ampco Metal in Acid-Resistant Service
Ampco Metal in Aircraft
Ampco Metal Centrifugal Castings
Ampco Metal in Heavy Machinery
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Metals in 1941

(CONTINUED FROM PAGE 159)

Lukens, Armco, and has three additional contracts ready to close. Another concern, the brothers Wolf, has recently signed several contracts to work slag heaps, with additional contracts ready to sign.

All in all, there is perhaps some 5,000,000 tons available in this country in old slag piles, some piles, of course, being far easier to work than others. The writer has recently looked over several slag piles no one has yet even investigated. One is particularly clean, with 20 years accumulation of skulls readily accessible.

As regards the pig iron picture, each day brings a new report and the facts are as contrary as mules. To greatly simplify a planned expansion that is not yet even settled in parts, it is the over-all strategy to have enough new blast furnace capacity in operation by late 1943 to support (with the help of new bessemer capacity) on the order of 97,000,000 tons of steel ingot capacity. Before these new pig iron facilities make their weight felt, it is the opinion in many quarters that more speedily built ingot capacity will be idle for want of raw material. Perhaps a situation like this could develop. Perhaps all excess scrap will be completely wiped off the market, and civilian campaigns will have pulled out their last pot and pan, razor blade, and hair pin from under the rear seat of an automobile. Then there could conceivably be a period in late 1942 and early 1943 when open hearths would be idle. But why wait for trouble? In the meantime it would seem that more iron could be squeezed out of existing blast furnaces, if the pressure gets tough enough.

Perhaps air conditioning units could be put on all furnaces. Of course, the argument still kicks around about relative humidities in the North and in the South, but none the less no furnace has yet been conditioned with modern equipment (either in the North or in the South) without an immediate jump in output. Equipping all furnaces with conditioners could perhaps squeeze out 2,000,000 more tons of pig a year—and such a tonnage would look pretty good right now. If there is any scarcity of conditioning equipment, perhaps some of the neat 600-ton units so common in Washington office buildings could be yanked out—it all depends on how deeply rooted a desire is to do something. And there is no doubt but what more general sintering practice and utilization of flue dust, likewise, could jump the nation's pig iron output. The potentialities of these practices have only so far been scratched.

And, as regards foundry iron, certainly the blast furnaces could be run on acid slag, the iron externally desulphurized with soda ash. The furnaces run like greyhounds with this practice, coke consumption goes down, and poorer coke can be used, and about 10 per cent more output results. The practice is common abroad, but so far gets little

The *MINUTE MAN* Says:

PROMPT BELT DELIVERY? VEELOS IN ROLLS ARRIVES ON-THE-DOT!

Uninterrupted Production!
This leading Mid-West manufacturer* guards production against belt trouble. "Every link of Veelos is a master link," states this company, "and the right tension can be maintained at all times."
*Name on request

THE "minute men" of industry — engineers and shop men who must save every possible minute of production time—are turning to the 60-second V-Belt—Veelos in rolls. Installation is a matter of minutes . . . adjustment is fast and easy. Veelos *in rolls* provides an automatic supply of matched V-Belts of any length . . . speeds production right down the line! And—right now—*Veelos deliveries are on-the-dot.*

JOIN THE MINUTE MEN!

Why not save valuable production time yourself? Let a Veelos sales engineer—especially trained in power transmission work—tell you how Veelos in rolls can boost your production without any increase in horsepower or manpower.

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VEELOS V-BELT
ADJUSTABLE to any length
ADAPTABLE to any drive

attention here. Perhaps 600,000 more tons of iron could be produced in this manner—ask any foundryman today what he would think of such a lift in output.

Also, there are some idle furnaces scattered around the country. For instance, consider the two Joliet furnaces, not operated for these past ten years, but with a potential capacity of 540,000 tons each. If someone in Washington could make up his mind what to do with them everyone would be happier. For the past six months they have been given to one company, then to another, but still they lie idle and will probably remain so for some time to come. Somewhat the same situation has applied in planning entirely new units. Consider the Provo installation as a horrible example. Literally the West Coast expansion scheme has been subjected to so much political wrangling, ineptness and delay that a full six months has been lost. Currently four new stacks are scheduled to go up at Provo, subject, of course, to change without notice. And, if some priorities are not forthcoming on turbo blowers and the like, they probably won't get into production until the middle of 1944. That's a long time to wait for more steel on the West Coast.

A. F. A. Meeting to Stress Pan-American Interests

• • • **In recognition** of the new interest shown by Central and South American countries in the work of the American Foundrymen's Association, the association's board of directors has announced that it is expanding the scope of the 1942 annual convention and is designating the meeting as the "First Western Hemisphere Foundry Congress." The program of the meeting is being developed to cover the interests of all foundries.

One of the highlights of the convention will be a defense exhibit which will display ordnance work arranged in a manner to bring out the possibilities of parts to be produced as castings.

Another feature of the meeting will be a symposium on graphitization sponsored by the Malleable Division under the chairmanship of Carl Joseph, Saginaw Malleable Iron Division of General Motors.

The convention will be held in Cleveland from April 20 to 24.

Welded Stainless Tubing Introduced by Globe Steel

Milwaukee

• • • **A stainless steel** welded tubing, which is expected to find wide use as tubing in the chemical and process industries, pulp and paper, oil and other industries where high corrosion resistance is needed, will shortly be in production at the local plant of the Globe Steel Tubes Co.

The method of welding the tubing, the company reports, is such as to result in a tube with very little flash, thus reducing the amount of grinding or cutting off of flash required to obtain a smooth finished tube. The new tubing can be bent, coiled, swaged or formed, it is claimed. The new tubing will be marketed under the trade name "Gloweld."

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It Costs Less to Operate—All gears are efficient stub-tooth spur gears running in a sealed oil bath . . . gear shafts and trolley wheels are equipped with heavy-duty ball or roller bearings.

It Costs Less to Maintain—Sturdy construction . . . seldom, if ever, requires removal from rail . . . covers of controller, motor, drum and gearing are easily removed.

It's Safe—Factor of safety of over 5 at full capacity . . . 100% Positive Automatic Stop when load reaches upper limit . . . Automatic Holding Brake prevents load from drifting when current is shut off . . . short, strong shafts minimize torsional stresses . . .

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MACHINE TOOLS

. . . SALES, INQUIRIES AND MARKET NEWS

Expansion of War Industries Brings Fresh Orders

Cleveland

• • • **The deluge of machine tool** orders continued over the holidays, as American industry followed Washington's urging for greater production and more expansion. The Cleveland Tractor Co. is reported to be expanding, and the Yoder Co. is rumored to have been asked to quadruple its shell output. To work on its recent gun order, the Yoder Co. is now buying barrel-turning machines, turret lathes for powder bores and breech mechanism equipment, so that expansion of its shell order will also place the company in the market for shell-turning lathes and shell cleaning and painting equipment. Meanwhile, the Hecker Co. has been practically doubling its recent machine tool orders.

Machine tool manufacturers are being called to Washington in groups, and there being exhorted to expand production and capacity as much as possible. Expense is no object, and financial assistance and blanket orders are offered as inducements. On the other hand, the OPA is still working toward establishment of a price ceiling for the industry, with little consideration being given to the rapidly increasing costs machine tool builders are facing. With labor an important item, the urged expansion of operations means the employment of inefficient help, more expense to train more men, and larger per unit labor costs in view of overtime work involved in maintaining operations around the clock and through holidays. Moreover, the "prince-and-pauper" nature of the industry, which probably resulted in an average of only ¾ per cent profit during the past decade, is being entirely ignored.

Machine tool builders have had some subcontracting trouble, in that many subcontractors have decided to go after original prime contracts to make a better margin on their output, thereby abandoning the firms which expended so much time, trouble, and money to seek out and develop their subcontractors. This means the machine tool builders have had to seek new subcontractors and go through their original development routine again. However, with more and more non-defense firms being hit by severe curtailment of material uses, the number of concerns either engaged in or seeking subcontracts continues to increase. What is going on in the machine tool and other industries is a period of "churning around" of such relationships that might have been expected.

The appointment of George C. Brainard, president of the General Fireproofing Co., to succeed Mason Britton, resigned chief of the Tools Branch of the OPM, met no adverse criticism in machine tool circles here, since Mr. Brainard is acknowledged to be a capable executive who is expected to take his new duties in stride.

Used Tools Not Moving

Chicago

• • • **Though it has been obvious** for many months that the cream of used machine tools had long been skimmed off, there is still available equipment which could be used advantageously for roughing purposes, at least, when production is such an urgent need. Yet, strangely, the used machinery market here experienced no pick-up after the country went into declared war. This is dissimilar to World War I when immediately after our entry into the conflict, production men scoured every available nook and cranny in a frantic search for anything that would cut metal. In this war, buyers apparently are coming to the used market only in final desperation. For instance, an aircraft company was forced to buy four used duplex millers here several weeks ago, because the original manufacturer who had dropped the machine many years ago refused to turn out some new ones today on a special order. Along the same line, it is reported that Borg-Warner bought all machinery, except foundry equipment, of the Stover Mfg. & Engine Co. of Freeport, Ill., in order to get some much needed machinery.

It is almost impossible to get a used turret lathe, milling machine or screw machine, but there are a number of other old lathes—notably engine—available. Since shell requirements are so important many machine tool experts are recommending use of old lathes and headstocks to make centering machines to speed up production on this urgent war implement.

Await Price Freezing Action

Cincinnati

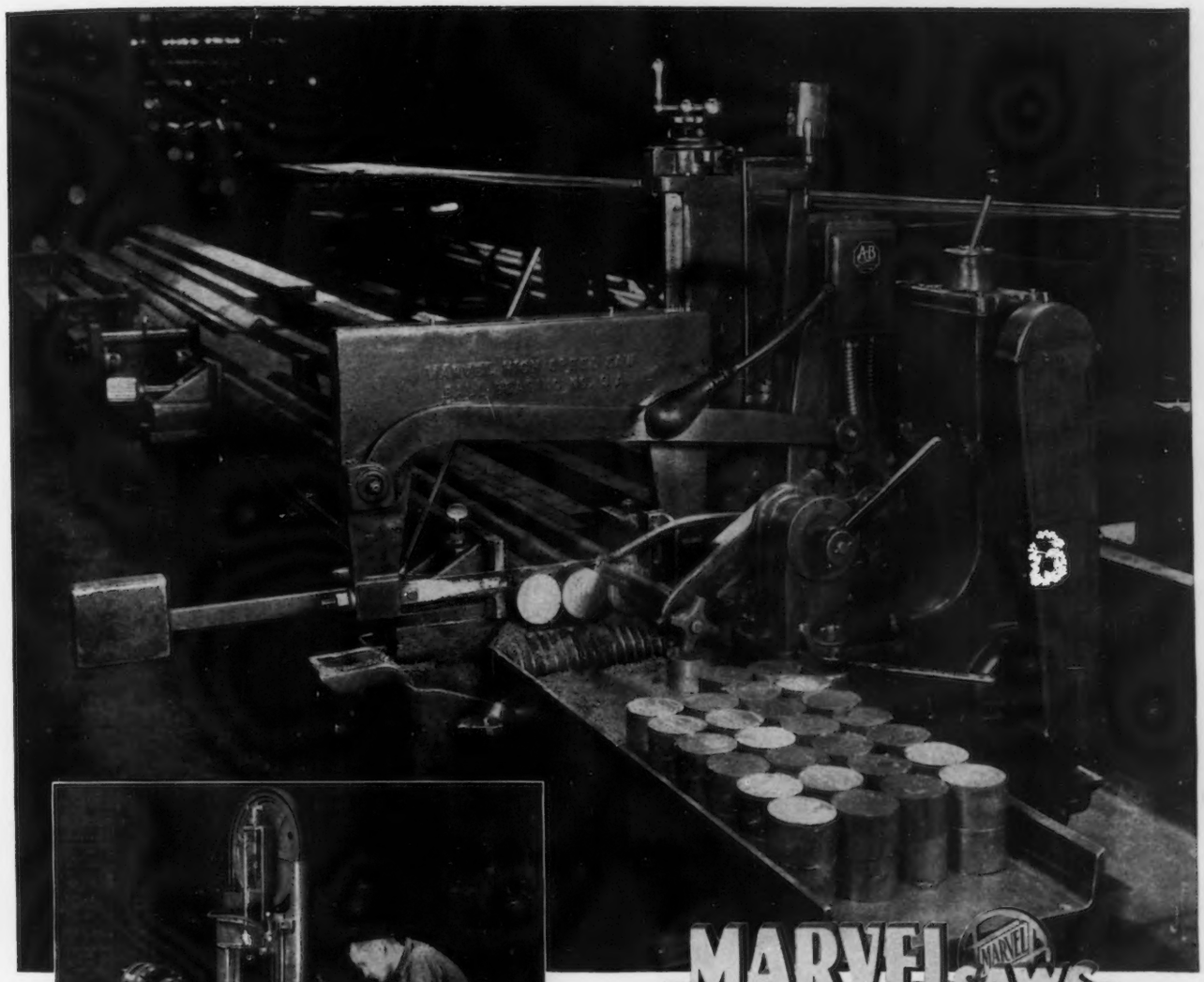
• • • **With a Washington conference** announced for early in January, price ceilings on new machine tools again occupy the attention of district machine tool builders. What the outcome of the meeting will be, of course, is in the realm of conjecture, but a good many have the feeling that the freezing of prices is reasonably certain. Of course, it is expected that manufacturers will be forearmed with data to show that too stiff a structure is bound to react upon production and some effort to obtain a reasonably pliable set-up is expected.

Plant operations are not expected to show any decrease because of the Christmas holiday, since some plants are working through the holiday period, while others increased night shifts or operated on Sundays so that the net result keeps production of machine tools in this area at a steady figure. Further broadening of orders during the past week was noted, thus increasing the pressure for still broad subcontracting and increase in present plant operations.

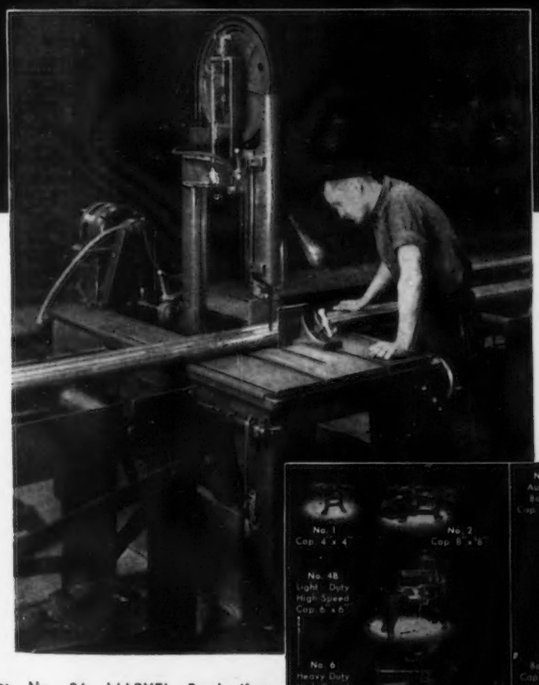
Heads Buffalo Office

Pittsburgh

• • • **Carnegie-Illinois Steel Corp.** has established Buffalo as a full district office, with William G. Crook as manager of sales. The territory embraces all of Western New York with several counties in Northern Pennsylvania also included. Mr. Crook has been in Buffalo since September, 1941, as assistant manager of sales.



MARVEL SAWS



handle orders as they come, at Jones & Laughlin Warehouse

Hot rolled and cold finished steel squares, rounds, hexagons and flats —single pieces or hundreds of pieces, lengths or slices, small bars or large (to 18" x 18") are cut off quickly, accurately and efficiently at the Jones & Laughlin Steel Corp. Detroit Warehouse with MARVEL SAWS. "We are very pleased with all machines" sums up their MARVEL experience.

ARMSTRONG-BLUM MFG. CO.

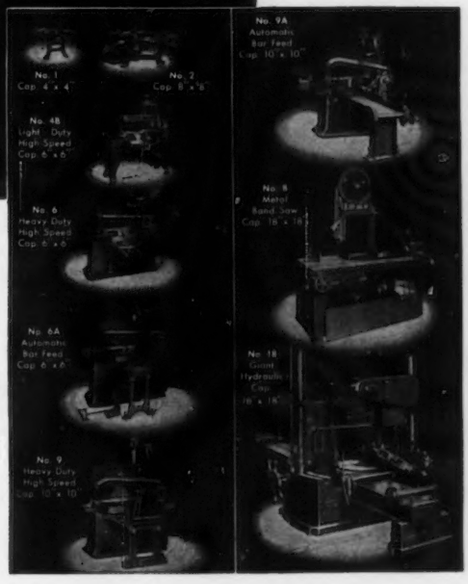
"The Hack Saw People"

5700 Bloomingdale Ave., Chicago, U.S.A.

***Eastern Sales Office:* 225 Lafayette St., New York**

Top: No. 9A MARVEL Production Saw automatically cutting-off quantity run—3 bars at a time. This heavy-duty all-ball-bearing machine cannot be surpassed in speed, simplicity, ruggedness and dependability.

Below: A universal No. 8 MARVEL Metal-cutting Band Saw, that cuts-off, miters, notches or cuts at any angle from 45° right to 45° left. Blade feeds into the work.



. . . Comparison of Prices

(Advances Over Past Week in **Heavy Type**; Declines in *Italics*)

(Prices Are F.O.B. Major Basing Points)

Flat Rolled Steel: (Cents Per Lb.)	Dec. 29, 1941	Dec. 22, 1941	Dec. 2, 1941	Dec. 30, 1940
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate	$5.00	$5.00	$5.00	$5.00
Manufacturing ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wire and Wire Products: (Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails: (Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp (grvd)	1.90	1.90	1.90	1.90

Pig Iron: (Per Gross Ton)	Dec. 29, 1941	Dec. 22, 1941	Dec. 2, 1941	Dec. 30, 1940
No. 2 fdy., Philadelphia	$25.84	$25.84	$25.84	$25.84
No. 2, Valley furnace	24.00	24.00	24.00	24.00
No. 2, Southern Cin'ti	24.06	24.06	24.06	23.06
No. 2, Birmingham	20.38	20.38	20.38	19.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa.	25.34	25.34	25.34	25.34
Basic, Valley furnace	23.50	23.50	23.50	23.50
Malleable, Chicago†	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago	31.34	31.43	31.34	30.34
Ferromanganese‡	120.00	120.00	120.00	120.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton. ‡For carlots at seaboard.

Scrap: (Per Gross Ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$23.50
Heavy melt'g steel, Phila.	18.75	18.75	18.75	21.25
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	20.75
No. 1 hy. comp. sheet, Det.	17.85	17.85	17.85	20.50
Low phos. plate, Youngs'n	23.00	23.00	23.00	26.50
No. 1 cast, Pittsburgh	22.00	22.00	22.00	22.75
No. 1 cast, Philadelphia	24.00	24.00	24.00	23.75
No. 1 cast, Ch'go*	21.00	21.00	21.00	19.25

*Changed to gross ton basis, April 3, 1941.

Coke, Connellsville: (Per Net Ton at Oven)				
Furnace coke, prompt	$6.125	$6.125	$6.125	$5.50
Foundry coke, prompt	6.875	6.875	6.875	5.75
Non-Ferrous Metals: (Cents per Lb. to Large Buyers)				
Copper, electro., Conn.*	12.00	12.00	12.00	12.00
Copper, Lake, New York	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	50.10
Zinc, East St. Louis	8.25	8.25	8.25	7.25
Lead, St. Louis	5.70	5.70	5.70	5.35
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

*Mine producers only.

On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

. . . Composite Prices

	FINISHED STEEL	PIG IRON	SCRAP STEEL
Dec. 22, 1941	2.30467c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.30467c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.30467c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One year ago	2.30467c. a Lb.	$23.45 a Gross Ton	$21.42 a Gross Ton

	High	Low
1941	2.30467c.,	2.30467c.,
1940	2.30467c., Jan. 2	2.24107c., Apr. 16
1939	2.35367c., Jan. 3	2.26689c., May 16
1938	2.58414c., Jan. 4	2.27207c., Oct. 18
1937	2.58414c., Mar. 9	2.32263c., Jan. 4
1936	2.32263c., Dec. 28	2.05200c., Mar. 10
1935	2.07642c., Oct. 1	2.06492c., Jan. 8
1934	2.15367c., Apr. 24	1.95757c., Jan. 2
1933	1.95578c., Oct. 3	1.75836c., May 2
1932	1.89196c., July 5	1.83901c., Mar. 1
1931	1.99629c., Jan. 13	1.86586c., Dec. 29
1930	2.25488c., Jan. 7	1.97319c., Dec. 9
1929	2.31773c., May 28	2.26498c., Oct. 29

A weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip. These products represent 78 per cent of the United States output. This revised index recapitulated to 1929 in the Aug. 28, 1941, issue.

	High	Low
1941	$23.61, Mar. 20	$23.45, Jan. 2
1940	23.45, Dec. 23	22.61, Jan. 2
1939	22.61, Sept. 19	20.61, Sept. 12
1938	23.25, June 21	19.61, July 6
1937	23.25, Mar. 9	20.25, Feb. 16
1936	19.74, Nov. 24	18.73, Aug. 11
1935	18.84, Nov. 5	17.83, May 14
1934	17.90, May 1	16.90, Jan. 27
1933	16.90, Dec. 5	13.56, Jan. 3
1932	14.81, Jan. 5	13.56, Dec. 6
1931	15.90, Jan. 6	14.79, Dec. 15
1930	18.21, Jan. 7	15.90, Dec. 16
1929	18.71, May 14	18.21, Dec. 17

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

	High	Low
1941	$22.00, Jan. 7	$19.17, Apr. 10
1940	21.83, Dec. 30	16.04, Apr. 9
1939	22.50, Oct. 3	14.08, May 16
1938	15.00, Nov. 22	11.00, June 7
1937	21.92, Mar. 30	12.92, Nov. 10
1936	17.75, Dec. 21	12.67, June 9
1935	13.42, Dec. 10	10.33, Apr. 29
1934	13.00, Mar. 13	9.50, Sept. 25
1933	12.25, Aug. 8	6.75, Jan. 3
1932	8.50, Jan. 12	6.43, July 5
1931	11.33, Jan. 6	8.50, Dec. 29
1930	15.00, Feb. 18	11.25, Dec. 9
1929	17.58, Jan. 29	14.08, Dec. 3

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.